Performance measures and performance targets in incentive systems : an empirical study of use and effects

Stellingen

behorende bij het proefschrift:

Performance Measures and Performance Targets in Incentive Systems: An Empirical Study of Use and Effects

1. Het 'informativeness' principe geeft een betere verklaring voor het gebruik van prestatiemaatstaven voor beoordelings- en beloningsdoeleinden in ondernemingen dan het 'controllability' principe.
   (Dit proefschrift).

2. Onzekerheid heeft een positief effect op het gebruik van financiële prestatiemaatstaven voor beoordelings- en beloningsdoeleinden in ondernemingen.
   (Dit proefschrift).

3. Niet zozeer het gebruik van prestatiemaatstaven, maar wel de haalbaarheid van de daaraan gerelateerde prestatiedoelen bepaalt het gedrag van managers.
   (Dit proefschrift).

4. Het in principe beschikbaar stellen van onderzoeksgegevens blijkt in feite een loos gebaar.
   (zie: Hartmann, F.G.H. & F. Moers (1999), Testing contingency hypotheses in budgetary research: an evaluation of the use of moderated regression analysis, Accounting, Organizations and Society, Vol. 24, pp. 291-315).

5. De veronderstelling dat er een objectieve realiteit bestaat, die onafhankelijk is van individuele percepties, is zowel een sterkte als een zwakte van economische theorieën.

6. Het publiceren van een empirisch management accounting artikel in een wetenschappelijk toptijdschrift is informatiever over de kwaliteit van een onderzoeker dan het publiceren van een empirisch financial accounting artikel in hetzelfde tijdschrift.

7. Aangezien stakingen die met loononderhandelingen samenhangen informatie verschaffen over de kwaliteit van vakbondsonderhandelaars, zouden deze onderhandelaars moeten worden afgerekend op het aantal stakingen waarbij zij betrokken raken.

8. Het is economisch eenvoudig te beargumenteren dat de invoering van een 'kleptocratentax' (d.i., inkomsten boven de Hfl. 3 miljoen worden tegen een tarief van 100% belast, waarbij de extra belastinginkomsten worden gedoneerd aan goede doelen) ongewenst is.

9. In 'Het Jaar van de Talen' is het verplicht schrijven van een Nederlandse samenvatting bij een Engelstalig proefschrift niet gepast.

10. Als studenten het maken van tentamens even serieus zouden nemen als het maken van klachten over tentamens, dan zouden de klachten vanzelf verdwijnen.

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PROEFSCHRIFT

ter verkrijging van de graad van doctor aan de Universiteit Maastricht,
op gezag van de Rector Magnificus, Prof. Dr. A.C. Nieuwenhuijzen Kruseman,
volgens het besluit van het College van Decanen, in het openbaar te verdedigen
op woensdag 4 juli 2001 om 16.00 uur

door

Frank Moers

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Frank Moers

CONTENTS

chapter 1

INTRODUCTION

1.1 Introduction

This dissertation empirically examines (*i*) the design of incentive systems for middle managers and (*ii*) the effects of incentive systems on middle managers' behavior.[1] It addresses the use of performance measures and the setting of performance targets for incentive purposes and the effects that this has on managerial behavior. The purpose of this dissertation is to empirically examine what factors explain the use of financial and non-financial performance measures and performance targets and how this use affects the behavior of managers.

In this dissertation, I use multiple disciplines to study the design and effects of incentive systems, although the purpose is not to, for example, integrate and/or compare different paradigms. My intentions are more modest. The aim of the 'multi-disciplinary' approach is to extend a certain research stream with the implications of another research stream studying the same problem but using a different perspective.[2] This extension is applied to two related research streams. First, I extend the behavioral-based literature on reliance on accounting performance measures with the implications of the

[1] In the remainder of this dissertation, I use the term subordinate manager instead of middle manager.

[2] Therefore, the multi-disciplinary approach is a means to an end, rather than an end in itself.

economics-based literature on managerial compensation to examine the factors that explain the use of performance measures. This multi-disciplinary focus provides me with three general performance measure characteristics that are related to the use of performance measures. Further, it establishes uncertainty as the dominant contingency factor that has an effect on the characteristics of different performance measures and thus their use.

Second, I extend the economics-based literature on the incentive effects of performance measures with the implications of the behavioral-based literature on target-setting to study the effects of incentive systems. This multi-disciplinary focus suggests that not only the use of performance measures for incentive purposes affect behavior but also the difficulty of the target associated with this performance measure.[3] Since both performance measures and performance targets are part of the incentive system, as I discuss below, the question is raised how these are related and what (additional) incentive effects difficult performance targets have.

In summary, the purpose of this dissertation is to use multiple disciplines (1) to examine the factors that explain the use of performance measures and (2) to examine the simultaneous effect of performance measures and performance targets on managerial behavior. Therefore, this dissertation addresses the following two general research questions:

(1) What factors explain the use of performance measures?

(2) How do performance measures and performance targets, as part of the incentive system, affect behavior?

1.2 Management Control and Incentive Systems

The topic of this dissertation is part of the broader field of management control. Management control has been defined in the literature in a variety of ways and a universally accepted definition of management control is still unavailable. However, despite the variety of definitions, all definitions provide the same common idea. To explain this common idea, I first make a distinction between the general concept of 'control' and the more specific concept of 'management control'.

Otley and Berry (1980) describe control as:

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[3] The difficulty of performance targets relates to the degree to which the targets can be achieved.

> *'...the ways in which organizations manage and regulate their affairs so as to remain viable and to achieve their chosen objectives'* (p. 231).

This definition is based on the cybernetic concept of control. Although the underlying idea of the cybernetic control model is applicable to the control of managers, the major objection to this model is that management control involves human beings. That is, management control is not only control of human beings but also control by human beings. One consequence of this human involvement is that the mere fact that human behavior is observed may change the behavior of these human beings.[4] The process of setting targets, using performance measures, and evaluating performance can therefore not be seen as a simple mechanical process (Anthony 1981). Since management control involves human beings, it can be defined as:

> *'...the process by which managers influence other members of the organization to implement the organization's strategies'* (Anthony 1981, p. 8).

This behavioral orientation is also emphasized by Lawler and Rhode (1976, p. 6) who state that:

> *'...the crucial aspect of any control system is its effect on behavior. ...The system needs to be designed in a way that assists, guides, and motivates management to make decisions and act in ways that are consistent with the overall objectives of the organization.'*

Management control is therefore about influencing the behavior of managers to ensure that they do what is best for the organization.

The key to effective management control is motivating employees. One way, though not the only way, to motivate employees is by implementing incentive systems. Incentive systems consist of three basic components (Merchant 1989). The first component is one or more measures of performance. Performance measures should provide information about the actions that managers have taken, even though these measures are likely to be affected by factors other than the manager's actions. Examples of performance measures are return on investment, product quality, and customer satisfaction.

The second component of the incentive system is the target that will be used to evaluate actual performance. These targets are necessary to distinguish

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[4] In contrast, observing an apple falling from a tree does not change the 'behavior' of the apple.

'good' from 'bad' performance and to provide managers with incentives to attain a certain target. Targets can be based on internal or external benchmarks, such as budgets or performance of similar entities.

Finally, the third component of the incentive system is the rewards given to managers. These rewards can be linked to performance to provide managers with incentives to improve performance. Examples of rewards are salary increases, bonuses, promotion, and increased autonomy.

In this dissertation, I focus on three types of performance measures: (1) financial performance measures, (2) internal non-financial performance measures, and (3) external non-financial performance measures. This classification is partly based on the literature (e.g., Larcker 1981; Gordon and Narayanan 1984; Ittner et al. 1997) and partly on the interviews with human resource managers of the firms participating in this study (see chapter 5). The financial performance measures are defined as the 'traditional' financial performance measures, such as return-on-assets, net income, and cash flows.[5] The internal non-financial performance measures consist of performance measures that are directly related to the tasks performed. Examples of these performance measures are productivity, efficiency, and successful implementation of projects. The external non-financial performance measures are defined as those performance measures that reflect performance in the market. Examples of these performance measures are market share, market growth, and customer satisfaction.

With respect to the second and third component of the incentive system, I focus on the difficulty with which performance targets can be achieved but I do not specifically examine how different types of rewards affect managerial behavior. Rather, I examine those performance measures and performance targets that are used to determine different types of rewards, such as salary increases, bonuses, and promotion.

1.3 Contributions

In anticipation of the empirical results, I briefly state the contributions that this dissertation makes to the literature. First, it explains the choice of performance measure characteristics and empirically examines how these affect the use of performance measures. Second, it simultaneously investigates the use of performance information of both a financial and non-financial nature. Third, this dissertation examines how different types of uncertainty affect the

[5] All examples presented with respect to each type of performance measure are measures actually used for incentive purposes by the participating firms.

characteristics of performance measures. Fourth, it investigates the incentive effects of both performance measures and performance targets. Fifth, it tests the theoretical claim that non-financial performance measures provide managers with incentives to be long-term oriented. Sixth, it examines the role of risk aversion in setting performance targets. Finally, it combines the implications of the economics-based literature and the behavioral-based literature, which provides a more complete analysis.

1.4 Overview of Dissertation

The remainder of this dissertation is organized as follows. In chapter 2, I review the empirical evidence of the use and effects of performance measures and performance targets to identify research opportunities. In chapter 3, I discuss different theoretical perspectives on the use and effects of performance. More specifically, I discuss agency theory, contingency theory, and goal theory, which are the theories underlying the research streams relevant for this dissertation. In chapter 4, I develop hypotheses, which are empirically tested using the research method described in chapter 5. In chapter 6, I present the empirical results and I conclude this dissertation with a summary and conclusion in chapter 7.

chapter 2

EMPIRICAL EVIDENCE OF THE USE AND EFFECTS OF PERFORMANCE MEASURES AND PERFORMANCE TARGETS

2.1 Introduction

In this chapter, I provide an overview of the economics-based and behavioral-based empirical managerial incentives literature. I focus on a selection of papers that are representative of the literature. For more complete reviews and discussions of the literature, see, for example, Briers and Hirst (1990), Pavlik et al. (1993), Hartmann and Moers (1999), Murphy (1999a), Prendergast (1999), Hartmann (2000), and Ittner and Larcker (2000). Rather than discussing the literature by theory, I discuss it by topic. This creates an opportunity for using multiple disciplines to study the same problem, which is likely to lead to more insight (Merchant et al. 2000). The topics that are discussed are the use of performance measures and the use of performance targets for incentive purposes and the effects that this has on managerial behavior and performance.

2.2 Empirical Evidence

2.2.1 The use and effects of performance measures

The assumption that managers will direct their behavior towards the performance measures used has long been recognized in both the behavioral and economics literature (e.g., Locke et al. 1968; Holmström 1979). The choice of performance measures is therefore crucial for providing managers with the

'correct' incentives. The empirical literature predominantly focuses on performance measures and incentives at the CEO level. Lambert and Larcker (1987) examine the use of stock market-based performance measures (stock returns, RET) relative to accounting performance measures (Return On Equity, ROE). More specifically, they examine the extent to which the use of RET relative to ROE is related to the relative noise in the performance measures, the stage of investment, and the extent to which the manager's wealth is tied to stock price. The empirical results indicate that the use of RET relative to ROE is positively influenced by the ratio of the time-series variance of ROE to RET, the correlation between ROE and RET, and the stage of investment and negatively influenced by the extent to which the manager's wealth is tied to stock price.

A second study investigating the use of accounting performance measures in top executive compensation is Sloan (1993).[1] Sloan (1993) examines whether compensation is more sensitive to accounting earnings (1) the higher the noise in stock returns relative to earnings and (2) the lower the correlation between the noise in stock returns and noise in accounting earnings. The empirical results show that the use of accounting earnings increases with increases in the relative noise and decreases in the correlation. Sloan (1993) interprets these results as consistent with the idea that although accounting earnings are noisier measures than stock returns, they are used in executive compensation contracts to shield executives from market-wide movements in stock price. That is, accounting earnings reflect firm-specific changes in stock price rather than market-wide changes. However, Lambert (1993, p. 122) states that Sloan's additional tests suggest that earnings are used because they are informative about the manager's actions over and above stock returns.

The studies by Lambert and Larcker (1987) and Sloan (1993) examine the use of accounting performance measures in executive compensation either in an absolute sense or relative to market performance measures (stock returns). Bushman et al. (1996) examine the relative use of individual performance measures in determining CEO annual bonuses. They state that individual performance measures will be used for incentive purposes when various value-enhancing activities are not (fully) reflected in corporate financial measures. Using a proprietary database from Hewitt Associates, Bushman et al. (1996) find that the relative use of individual performance measures increases with the firm's growth and investment opportunities, product development cycle, and product life cycle. The use of these performance measures is, however, not related to the noise in either accounting earnings or stock returns.

Ittner et al. (1997) investigate the use of financial performance measures (e.g., net income), relative to the use of non-financial performance measures

[1] For an in-depth discussion of Sloan's paper, see Lambert (1993).

(e.g., customer satisfaction) in determining the annual bonus of CEOs. They examine the extent to which the relative use of non-financial performance measures is related to the use of an innovation-oriented strategy, quality strategy, regulation, financial distress, noise in financial performance, and the power of CEOs.[2] Using the incentive weights stated in proxy statements and confidential compensation consulting surveys, they find that the relative use of non-financial performance measures is positively affected by the use of an innovation-oriented strategy, quality strategy, regulation, and noise in financial performance but not affected by financial distress. Contrary to expectations, they find that the power of CEOs is negatively related to the relative use of non-financial measures.

The above four studies all examine the use of performance measures at the CEO level. For more complete reviews of the CEO incentive literature, I refer to the papers by Pavlik et al. (1993) and Murphy (1999a).

The accounting literature, however, has so far paid much less attention to explaining the use of performance measures at lower levels in the organization. Govindarajan (1984) examines the effect of environmental uncertainty on the extent to which subjectivity is used in evaluating business-unit managers. The empirical results indicate that environmental uncertainty increases the percentage of the total bonus that is based on subjectivity. Govindarajan interprets these results as consistent with the assumption that financial performance measures become less controllable as environmental uncertainty increases. Therefore, increased environmental uncertainty increases the need for superiors to rely on alternative performance measures in evaluating and compensating managers, such as subjective performance evaluation.

Bushman et al. (1995) study the use of aggregate performance measures in compensating business-unit managers.[3] By aggregate performance measures they mean performance measured at an organizational level higher than the business-unit level, for example, the firm-level. The empirical results show that interdependence, proxied by diversification and intrafirm sales, increases the relative use of aggregate performance measures. This result can be explained by the fact that interdependence will lead to spillover effects of managers' actions and performance measures at a higher organizational level will be informative about these spillover effects.[4]

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[2] The power of the CEO relates to the degree to which the CEO can influence the Board of Directors. More powerful CEOs can force more attention to non-financial performance measures.

[3] For an in-depth discussion of the paper by Bushman et al. (1995), see Lanen (1995).

[4] Spillover effects mean that the decisions made by the manager of department X have an impact on the performance of department Y. Therefore, the performance of department Y is

Keating (1997) addresses a problem similar to that of Bushman et al. (1995). Keating (1997) investigates the determinants of the use of division accounting metrics, firm accounting metrics, and firm stock price metrics in the evaluation of division managers. The factors that are hypothesized to affect the use of these performance measures are (1) two types of interdependencies, (2) correlation between division earnings and division value, (3) division growth opportunities, (4) firm growth opportunities, (5) division size, and (6) correlation between firm stock returns and market returns. The results from the empirical analysis, first of all, show that the use of division accounting metrics increases with the correlation between division earnings and division value and decreases with the division growth opportunities. Second, the use of firm accounting metrics decreases with firm growth opportunities and the impact that other managers have on the manager's division and increases with the impact that the division manager has on other divisions. Finally, the use of firm stock price metrics increases with division size and the correlation between firm stock returns and market returns.

The papers discussed so far focus on the use of performance measures and their determinants. These performance measures are intended to have an effect on performance and managerial behavior. Empirical research in accounting predominantly focuses on the incentive effects of financial performance measures. Banker et al. (1996a) examine the performance improvements following the implementation of an incentive plan in a retail firm. The incentive plan consists of a quarterly bonus plan based on sales for sales consultants, sales department supervisors, and managers. They gather data from 15 stores with an incentive contract and 19 'control' stores without the incentive contract. Their results indicate that the sales for stores that work under the incentive contract increases after the implementation of the bonus plan and that this increase is higher for larger stores. Furthermore, the performance impact tends to persist and increase over a time. Finally, the incentive effect in the fourth quarter, which is characterized by the employment of temporary personnel, is lower, which suggests that the incentive plan is less effective for temporary workers.

In a related study using the same research site, Banker et al. (1996b) examine how the performance improvements following the implementation of the incentive plan are moderated by contextual factors. More specifically, they examine the moderating effect of competition, upscale markets, and level of monitoring. They find that the sales and profit improvements following the implementation of the incentive plan are higher the greater the intensity of

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influenced by the manager of department X and, as a result, provides information about the decisions made by this manager.

competition, the more upscale the market, and the lower the existing level of monitoring. The effect of the incentive plan on improvements in customer satisfaction is greater, the more upscale the market.

Recently, researchers have started to investigate the performance effects of adopting residual income-based incentive plans. Proponents of economic income measures claim that these performance measures provide better incentives to maximize shareholder value than traditional accounting performance measures (e.g., Stern et al. 1995). The empirical evidence, however, provides mixed results. Wallace (1997) compares the performance of adopters and non-adopters of residual income-based incentive plans. He finds that adopters of residual income-based incentive plans exhibit greater changes in residual income, over one year, than control firms matched on industry and size. Hogan and Lewis (1999) extend the study by Wallace (1997) and examine the long-run performance impact of incentive plans based on economic profits (e.g., residual income). They find that the operating performance and stock performance of adopters of economic profit plans increase significantly in the year of adoption and the four years following the adoption. However, they also find that the adopters of these particular incentive plans are relatively poor performers. An examination of the performance improvements of adopters compared to a control sample of non-adopters, matched on size and past profitability, shows no significant differences. As a result, it is not clear whether incentive plans based on economic profit like measures provide better incentives to create shareholder value than incentive plans based on traditional financial performance measures.

In contrast to the studies discussed above, Govindarajan and Gupta (1985) and Banker et al. (2000) examine the performance effects of using non-financial performance measures. Govindarajan and Gupta (1985) investigate whether linking performance measures to business-unit strategy will improve performance. Following the contingency theory perspective, they hypothesize that short-run performance measures will be more effective for business-units following a harvest strategy, while long-run performance measures will be more effective for business-units following a build strategy.[5] Their empirical results show that the use of long-run performance measures increases the performance of 'build business-units' but decreases the performance of 'harvest business-units'. However, the performance effect of using short-run performance measures is not significantly different between 'build business-units' and 'harvest business units', which suggests that short-run performance measures are equally effective for all business-units.

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[5] The short-run performance measures are similar to financial performance measures, while the long-run performance measures are similar to non-financial performance measures.

Banker et al. (2000) examine the performance effects following the implementation of an incentive plan that includes non-financial performance measures. They analyze archival data from 18 hotels of a hotel chain, which moved from an incentive plan that was based on financial performance measures to an incentive plan that included measures of customer satisfaction. Their findings indicate that customer satisfaction improves significantly after the implementation of the incentive plan and that the measures of customer satisfaction are leading indicators of financial performance. Further, financial performance also improves significantly due to the implementation of the incentive plan, which suggests that the incentive plan has a direct effect and an indirect effect, working through customer satisfaction, on financial performance.

Related to this stream of research are studies that examine the effect of performance measure use on various aspects of managerial behavior. The accounting literature pays a considerable amount of attention to the effects of earnings-based incentive plans on earnings management. In general, the studies by Healy (1985), Gaver et al. (1995), and Holthausen et al. (1995) provide mixed evidence with respect to the extent to which earnings-based incentive plans provide managers with incentives to make accrual decisions, i.e., changing reported income, that maximize their bonus. Guidry et al. (1999) state that these mixed results are partly due to the use of aggregated data from a large number of firms. They provide a more powerful test by examining earnings management by business-unit managers using business-unit-level data. Guidry et al (1999) compare the accrual behavior of three portfolios of business-unit managers: (1) managers who did not earn a bonus (LOW), (2) managers who received the maximum bonus (UPP), and (3) managers who received some bonus, but lower than the maximum (MID). The bonus-maximization hypothesis predicts that managers in the LOW and UPP portfolios will make income-decreasing accrual decisions, while managers in the MID portfolio will make income-increasing accrual decisions. The empirical results are consistent with this hypothesis and indicate that business-unit managers manipulate reported income to maximize their bonus.

Similarly, Merchant (1990) studies the effect of financial controls on data manipulation and management myopia of profit center managers. His results show that an increased use of financial controls leads profit center managers to pull profits from future periods by deferring expenditures and accelerating sales. Furthermore, financial controls discourage new ideas and provide profit center managers with incentives to be short-term oriented.

While the studies by Merchant (1990) and Guidry et al. (1999) examine the (assumed) dysfunctional consequences of incentive plans, Wallace (1997) examines the (assumed) functional consequences. In his study of residual income-based incentive plans, Wallace (1997) examines the investment,

financing, and operating decisions of managers. He finds that, compared to the control firms, adopters of residual income-based incentive plans tend to increase asset disposition, decrease new investments, increase share repurchases, and utilize assets more intensively. Whether or not these decisions actually increase shareholder wealth is not clear (Wallace 1997, p. 287). However, these decisions are consistent with the incentives provided by the incentive plan, leading to the conclusion that 'what you measure is what you get'.

Another important stream of research on the effects of performance measures on managerial behavior is the *reliance on accounting performance measures* (RAPM) literature. The question that this literature tries to answer is how RAPM affects performance and job-related attitudes of lower-level managers under different circumstances. The circumstances investigated either explicitly or implicitly relate to uncertainty (Hartmann 2000) and the *general* line of reasoning in this literature is that accounting performance measures (APM) are less appropriate when uncertainty is high. Hirst (1983), for example, examines the effect of RAPM on job-related tension and social withdrawal under different levels of task uncertainty. He finds that RAPM results in higher (lower) job-related tension under conditions of high (low) task uncertainty, but that social withdrawal is unaffected.

Brownell (1985) examines the appropriateness of RAPM for different functional areas, i.e., marketing and R&D. The different functions are associated with different levels of task and environmental uncertainty, where R&D is characterized by higher levels of uncertainty relative to marketing. Brownell (1985), however, finds that the effect of RAPM on performance is not affected by functional area.

Imoisili (1989) investigates the effect of RAPM on performance, stress, and attitudes toward the budget for different levels of task uncertainty and task interdependence. The empirical results indicate that both task uncertainty and task interdependence do not affect the relationship between RAPM and any of the outcome variables.

Finally, Dunk (1992) tests the prediction that APM are more appropriate for evaluating production managers when the production process becomes more automated. His results show that the effect of RAPM on subunit performance is more positive the more the production process is automated.

The results of the above four studies are representative of the overall results in the RAPM literature, i.e., it is unclear how uncertainty affects the appropriateness of APM. For an elaborate literature review of the RAPM literature, I refer to the recent paper by Hartmann (2000).

2.2.2 *The use and effects of performance targets*[6]

Although there is a large body of literature on the use of performance measures, far less attention has been paid to the use of performance targets (see Ittner and Larcker (2000) for a similar remark). Only a small number of papers exists on the use of performance targets in CEO incentive contracts. For example, Puffer and Weintrop (1991) examine the role of performance expectations in CEO turnover. They expect that the Board of Directors will evaluate the performance of CEOs compared to certain targets and will base their dismissal decision on whether performance has met the target. Their empirical results show that actual earnings compared to performance expectations, proxied by analysts' earnings forecasts, are a significant predictor of CEO turnover. Furthermore, accounting performance and market performance *per se* are not significantly related to CEO turnover. These results suggest that performance targets are a relevant component of CEO incentive contracts.

Murphy (1999b) examines the type of performance targets used in CEO incentive contracts and the effects that these have. He distinguishes between 'internally determined' targets (e.g., prior year performance) and 'externally determined' targets (e.g., peer performance). The main difference between these two types of targets is that internally determined targets can be influenced by plan participants, while externally determined targets are relatively unaffected by plan participants. Murphy (1999b) finds that CEOs who are evaluated based on internally determined targets are more likely to smooth earnings and thus have less variable bonus payouts compared to CEOs who are evaluated based on externally determined targets. He states that these results are due to the fact that internally determined targets allow ratcheting, while this effect is absent when using externally determined targets.[7]

Indjejikian et al. (2000) examine the degree to which the earned bonus exceeds the target bonus, which they label 'abnormal' bonus. Using Hewitt's compensation survey data, they find that, on average, earned bonuses exceed target bonuses, which implies that targets are achievable on average. Furthermore, they show that targets do not fully incorporate past performance, i.e., the ratchet principle is not fully applied, since abnormal bonuses are positively serially correlated. Finally, Indjejikian et al. (2000) find that the

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[6] This section predominately focuses on the *difficulty* of performance targets. Although, the RAPM literature addresses target-related issues, it does not address the issue of difficulty and therefore it was discussed in the previous section.

[7] Ratcheting occurs when performance targets are adjusted upward (downward) when actual performance in the previous period exceeds (falls short of) targeted performance. In chapter 3, I discuss the ratcheting principle more fully.

magnitude of the abnormal bonus is positively related to measures of information asymmetry, which suggests that if managers have private information, they will bias targets downward leading to achievable targets.

Other research at the CEO level that is somewhat related to the use of performance targets is the literature on relative performance evaluation. Economic theory suggests that relative performance evaluation is valuable if the performance of peers is (partly) affected by the same exogenous factors as the performance of the manager being evaluated (Holmström 1982). However, despite the theoretical argumentation in favor of relative performance evaluation (RPE), the empirical results provide mixed evidence (Antle and Smith 1986; Gibbons and Murphy 1990; Janakiraman et al. 1992). Most of these studies assume that RPE is equally relevant for all firms. One exception to this is a recent study by DeFond and Park (1999). DeFond and Park (1999) investigate the effect of competition on the use of RPE in CEO dismissal decisions. They find that RPE-based accounting performance measures are significantly related to CEO turnover in high competition industries but not related to CEO turnover in low competition industries. These results suggest that firms apply RPE, taking into account the environmental conditions.

For lower levels in organizations only limited evidence exists on the use and effects of performance targets. The most influential study on target setting is the field study by Merchant and Manzoni (1989). Merchant and Manzoni (1989) gather data from 54 profit centers in 12 firms and examine the use and achievability of budget targets. They find that most firms use more than one financial target for incentive purposes and managers are paid bonuses for exceeding a certain threshold. Nine firms also include an upper bound, where no additional bonuses are paid for exceeding the upper bound. The most interesting finding of their study is that most profit center managers in their sample reach their target eighty to ninety percent of the time, which leads to the conclusion that the targets are highly achievable. The finding that targets are highly achievable is inconsistent with the prescriptions in management accounting textbooks, which suggest that targets should be reached less than fifty percent of the time. However, Merchant and Manzoni (1989) state that superiors set targets keeping in mind the possible effects that these have on managerial behavior. That is, difficult performance targets will increase motivation in the current 'period' but they will destroy motivation in future 'periods' because the targets are simply unachievable. Furthermore, highly achievable targets are set to reduce the incentives to manage earnings, while less achievable targets are set to promote decisions that lead to short-term profits.

Simons (1988) investigates the effect of organizational characteristics on the difficulty of budget goals. He finds weak support for his hypothesis that, due to the assumed differences in information processing capabilities, the budgets of

prospector firms are more difficult than the budgets of defender firms. Furthermore, he finds that the difficulty of budget goals is positively related to the use of ex post monitoring controls and budget-based compensation. These results suggest that firms use additional controls to set difficult budget goals and are more likely to do this in situations where managers have incentives to bias targets downward. Consistent with Merchant (1985), Simons finds that budgetary participation is positively related to difficult budget goals, even after controlling for the use of ex post monitoring controls. Finally, Simons (1988) shows that the positive effect of difficult targets on task performance found in the psychological goal setting literature (see Locke and Latham (1990) for an overview) extends to the firm level. That is, target difficulty increases firm performance.

Shields et al. (2000), on the other hand, do not find a direct relationship between target difficulty and job performance but rather an indirect effect. More specifically, they find that target difficulty increases stress, which subsequently decreases performance. Shields et al. (2000) state that this relationship might be one reason for firms to set achievable targets, as the study by Merchant and Manzoni (1989) indicates.

Related to the issue of the difficulty of performance targets is the issue of budgetary slack.[8] Merchant (1985) examines how manufacturing managers' propensity to create budgetary slack is related to the importance placed on meeting the budget, the extent of participation, the predictability in the production process, and superior's ability to detect slack. The empirical results show that the propensity to create budgetary slack decreases with the extent of participation, the predictability in the production process, superior's ability to detect slack and the use of budgets in evaluating managers. One explanation for this last finding can be found in the positive correlation between the importance placed on meeting the budget and superior's ability to detect slack (Merchant 1985, p. 205). The more important the budget is for evaluating managers, the more likely it is that superiors will detect slack (Williamson 1964), which decreases managers' propensity to create slack.

In a recent study, Van der Stede (2000) finds similar results. Van der Stede (2000) examines control systems at the business-unit level and finds, consistent with Merchant (1985), that the use of rigid budgetary controls decreases budgetary slack. He further finds that budgetary slack and managerial short-term orientation are negatively correlated, which suggests that managers are less short-term oriented if the targets allow them to do so. Finally, Van der Stede (2000) shows that past performance is positively related to 'current'

[8] Budgetary slack leads to a higher probability of achieving the budget. Therefore, budgetary slack and budget difficulty are negatively correlated or antonyms.

budgetary slack. This finding is consistent with the idea that good performers are subsequently 'rewarded' with slack, which gives these managers more flexibility and discretion (Merchant and Manzoni 1989).

Leone and Rock (1999) examine the use of ratcheted targets and the effects that these have on bonus maximizing behavior. Using archival data from a large multinational firm, they find that the targets of business unit managers ratchet. The empirical results further show that if business unit managers perceive that targets ratchet, rather than being static, the bonus maximizing discretionary accruals are lower. Finally, they show that the accrual behavior of managers is better explained under the assumption that ratcheting takes place than under the assumption that targets are static.

2.3 Summary and Research Opportunities

The available empirical evidence of the use and effects of performance measures and performance targets is summarized in table 2.1. Table 2.1 makes a distinction between the empirical evidence available at the highest level in the organization (CEO level) and levels lower in the organization (subordinate level). The focus of this dissertation is on the subordinate level and therefore I discuss the research opportunities at this level. I refrain from discussing the research opportunities at the CEO level until chapter 7.

The overview shows that the empirical evidence at the subordinate level is dominated by the RAPM literature, which studies the contextually determined *effects* of financial performance measures. Further, by taking a closer look at table 2.1, the following 'gaps' can be identified. First, regarding the performance dimension, there is lack of empirical evidence on the use and effects of non-financial performance measures and targets. Second, regarding the incentive system components, the emphasis seems to be on performance measures with only little attention being paid to performance targets. Finally, regarding the use versus effects of performance measures, the empirical literature does not pay much attention to explaining the use of performance measures. Overall, table 2.1 shows that there are a number of under-investigated areas in the literature.

Although I organized the discussion of the empirical literature by topic, organizing it by disciplinary focus would have led to a similar overview and the same under-investigated areas. Merchant et al. (2000) state that research on incentive systems can be characterized as narrowly focused on either the economic sciences or the behavioral sciences. They examine the extent of this problem by using a citation and content analysis of incentive systems research in accounting. Their results, first of all, show that most of the papers analyzed can

be classified as either economics-based or behavioral-based, which indicates that relatively little cross-fertilization has taken place. Second, the analysis indicates that the economics-based papers predominately focus on the CEO level, while the behavioral-based papers predominately focus on the subordinate level.[9,10] Finally, the majority of the behavioral-based papers includes outcome variables (effects) in their study, while only a minority of the economics-based papers does so. These results of Merchant et al. (2000) are consistent with implications of table 2.1.

Obviously, the mere existence of under-investigated areas in the literature and the lack of cross-fertilization are not sufficient reasons to explore these areas. However, in my opinion, the above identified under-investigated areas are worthy of attention for the following reasons. First, the lack of empirical research on non-financial performance measures is problematic since these measures are becoming increasingly important in firms (Banker et al. 2000). Examining the use of non-financial performance measures and the effects that these have is therefore valuable. Second, performance targets, and the difficulty associated with these targets, can have significant incentive effects, as evidenced by the goal setting literature (Locke and Latham 1990). However, accounting studies on incentive effects predominately rely on agency theory and, as a result, examine the effects of performance measures. Given that (1) incentive systems consist of both performance measures and performance targets and (2) that both components have incentive effects, examining the simultaneous impact of the two components can lead to a significant contribution to the literature. To make this contribution, however, the agency theory-based 'incentive effects studies' should be extended with the implications of 'target difficulty studies', which are based on goal theory. Finally, the lack of attention given to explaining the use of performance measures seems to be driven by methodological issues not theoretical.[11] RAPM studies, which apply contingency theory, examine the *conditional* effects of using (accounting) performance measures. However, this

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[9] The four major research streams defined in the notes of table 2.1 can be classified as follows. The 'managerial compensation studies' and 'incentive effects studies' are economics-based papers, while the 'RAPM studies' and 'target difficulty studies' are behavioral-based papers.

[10] The focus on the CEO level by 'economists' and on the subordinate level by 'behaviorists' can (partly) be explained by their training (Merchant et al. 2000). Doctoral programs for economists primarily emphasize econometrics, while doctoral programs for behaviorists primarily emphasize survey and field research methods. As a result, economists focus on large databases containing publicly available data (e.g., S&P's ExecuComp), while behaviorists gather their 'own' data, which is less difficult at the subordinate level than at the CEO level.

[11] I explain this point more fully in chapter 3.

emphasis on the 'conditional effects of use' is different from the emphasis of earlier contingency studies that examine the 'conditions that affect use'. Given the slow progress in the RAPM area (Hartmann and Moers 1999; Hartmann 2000), it is useful to go back to the basic premise of contingency theory and study the factors that explain the use of performance measures.[12] Furthermore, the RAPM literature can benefit from incorporating the implications of the 'managerial compensation studies', since these studies, and especially the agency theory applied, focus on the factors that determine the use of performance measures.

Table 2.1
Number of empirical studies on the use and effects of performance measures and performance targets at different organizational levels

			CEO level	Subordinate level
Financial Performance	Measures	Use	Substantial (A)	Little
		Effects	Substantial (B)	Substantial (B+C)
	Targets	Use	Little	Little
		Effects	Little	Some (D)
Non-financial Performance	Measures	Use	Some (A)	Little
		Effects	-	Little
	Targets	Use	-	-
		Effects	-	-

Notes:

[a] CEO level: highest level in the organization;
Subordinate level: organizational levels below the CEO level, for example, business unit, division, and department.

[b] (A): *Managerial compensation studies*; these studies focus on explaining the use of performance measures. Theoretical basis: economics (agency theory);
(B): *Incentive effects studies*; these studies examine the incentive effects provided by performance measures. Theoretical basis: economics (agency theory);
(C): *RAPM studies*; these studies examine the contextually determined effects of Relying on Accounting Performance Measures. Theoretical basis: behavioral (contingency theory);
(D): *Target difficulty studies*; these studies examine the effects of the difficulty with which performance targets can be achieved. Theoretical basis: behavioral (goal theory).

[12] Notice that studying the factors that explain the use of management accounting practices does not preclude examining the effects of management accounting practices. It simply means that a different model should be applied (see Luft and Shields (2000) for an overview of different 'structural models').

This dissertation tries to contribute to the literature by adding empirical evidence to all three under-investigated research areas identified above. In order to make this contribution, I combine the implications of the theories underlying the four major research streams mentioned in table 2.1. In the next chapter, I therefore describe the three theories that are relevant to this dissertation, i.e., agency theory, contingency theory, and goal theory.

chapter 3

THEORETICAL PERSPECTIVES ON THE USE AND EFFECTS OF PERFORMANCE MEASURES AND PERFORMANCE TARGETS

3.1 Introduction

In the previous chapter, I provided an overview of the empirical literature on the use and effects of performance measures and performance targets and identified opportunities for further research. In this chapter, I describe the three theories relevant for this dissertation, i.e., agency theory, contingency theory, and goal theory, and show, in a general way, how the implications of these theories can be combined to address these research opportunities. In chapter 4, I am more specific and develop hypotheses based on these theories.

3.2 The Use and Effects of Performance Measures

3.2.1 Economic focus

The economics-based empirical papers discussed in the previous chapter use agency theory in developing hypotheses. Therefore, I restrict myself to describing the principal-agent model to analyze the economic focus on incentive systems.

Principal-agent model[1]

The principal-agent model (hereafter written as P/A model) is an economic model based on expected utility analysis. Expected utility assumes economic rationality and complete, transitive, and smooth preferences (Demski 1994). The P/A model normally assumes a risk-neutral principal and a risk and work averse agent. The basic issue of the P/A problem is to design an optimal contract which trades-off risk sharing and incentives. Risk sharing relates to the allocation of risk with respect to an uncertain outcome, while incentives ensure that the agent will take actions desired by the principal. The theory proposes generally that incentive contracts are written based on jointly observable signals.[2] Jointly observable means that both the principal and the agent observe, verify and agree on the signal being used. In its simplest form, a jointly observable outcome x is used as contracting variable. The relationship between the action of the agent (a) and the outcome (x) can be described by $x = x(a,\theta)$, in which θ is a random variable that reflects the effect of uncontrollable factors. The agent's compensation (s) is defined as some function of the outcome x, i.e., $s = s(x)$. The utility function of the principal is $G(w)$, where w is the wealth of the principal characterized by x-$s(x)$. The utility function of the agent is $H(s(x),a) = U(s(x)) - V(a)$, where $U(s(x))$ is the utility of compensation and $V(a)$ is the disutility of effort to the agent. The question that the P/A model tries to answer is: what incentive contract maximizes the utility of the principal subject to the constraints that (1) the agent is paid at least his opportunity cost and (2) he chooses the 'right' action. This can be formally stated as:

$$\max_{s(x),a} \int G(x - s(x)) f(x \mid a) dx$$

$$\text{subject to} \quad \int U(s(x)) f(x \mid a) dx - V(a) \geq M$$

$$a \in \arg\max_{a} \int U(s(x)) f(x \mid a) dx - V(a)$$

The density function $f(\cdot)$ relates to the distribution of $F(\cdot)$, which is the distribution of x given a.[3] The first constraint is called the 'individual

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[1] The discussion in this section is based on the results from the *analytic* literature. This literature analyzes 'economic problems' by way of mathematical models in order to explain certain observed practices and/or predict the occurrence of certain practices.

[2] See for an exception, for example, Baiman and Rajan (1995).

[3] Both $F(\cdot)$ and $f(\cdot)$ are twice differentiable and $F_a(x|a) \leq 0$, for all $x \in X$, $a \in A$, which means that x can be influenced by a. Assuming two action levels a_1 and a_2 with $a_1 < a_2$, then

$$F(x|a_1) \geq F((x|a_2) \text{ for all } x.$$

rationality' or 'participation' constraint. It simply states that the expected utility of the agent should be higher than or equal to that what he can get elsewhere, i.e., M. The second constraint is the 'incentive compatibility' constraint, which implies that the agent will maximize his effort in a way that his marginal revenue (i.e., compensation) equals his marginal cost (i.e., disutility of effort). The second constraint can therefore be restated to:

$$\int U(s(x)) f_a(x,a)dx = V'(a)$$

This is called the first-order approach.[4]

The type of incentive contract that is optimal predominantly depends on the amount of information asymmetry. Information asymmetry can exist with respect to the actions of the agent and the 'state of nature', i.e., the uncontrollable factors. In the following, I focus on information asymmetry with respect to the agent's actions.

If the actions of the agent can be jointly observed, then no incentive problem exists and the P/A model breaks down to one of optimal risk sharing. In this case the optimal incentive contract is characterized by

$$\frac{G'(w)}{U'(s(x))} = \lambda$$

In other words, the optimal incentive contract pays the agent a fixed wage.

Assume that the principal wants the agent to take action $\hat{a}$. To ensure that the agent takes the desired action, the principal can design a *forcing contract*, which pays the agent a straight salary if and only if â is observed, i.e.,

$$\begin{cases} s(x) & \text{if} \quad \hat{a} = a \\ z & \text{if} \quad \hat{a} \neq a \end{cases}$$

This means that action a_2 dominates action a_1 in terms of first-order stochastic dominance. Thus, the high action level leads to a higher probability of a high outcome than the low action level. This is also known as the monotone likelihood ratio condition (MLRC).

[4] The use of the first-order approach is not always valid in analytical modeling. See for a discussion of the validity of this approach, for example, Rogerson (1985).

in which z is a sufficient penalty. The principal can simply observe what action the agent has taken and reward him if he has taken the correct action and penalize him if he has not. This situation is the first-best situation.

If the principal is unable to observe the actions of the agent or it is too costly to do so, then it is impossible to contract on this information since it is not jointly observable. This is called the 'moral hazard' problem. Moral hazard is a necessary but not a sufficient condition for the existence of a control problem. In general, three other requirements should be met (see e.g., Demski 1994): (1) the agent should be risk averse, (2) the outcome should be affected by uncontrollable factors, and (3) there should be an inherent conflict of interest.[5] Without risk aversion, the agent is able to carry all the risk and internalize the goals of the principal. On the other hand, if the outcome is not affected by uncontrollable factors, then the agent's actions can be perfectly deduced from the outcome observed, which brings us back to the first-best situation. Finally, if there is no conflict of interest, then there is nothing to control, in terms of making sure that the agent takes the right action. Assuming that all the above requirements are met and there exists a control problem, the optimal incentive contract is characterized by

$$\frac{G'(w)}{U'(s(x))} = \lambda + \mu \frac{f_a(x \mid a)}{f(x \mid a)}$$

That is, the optimal incentive contract consists of a fixed component (λ) and a variable component, which depends on the outcome x ($\mu(f_a(\cdot)/f(\cdot))$). The higher the outcome x, the higher the agent's compensation. Although this contract is optimal, given the circumstances, it is a second-best solution. The contract is not only affected by the risk-sharing problem, but also by the incentive problem, which leads to the following trade-off: to ensure that the agent provides effort, his compensation depends on the outcome x; however, this allocates risk to the agent for which he needs to be compensated because he is risk averse; as a result, the expected compensation cost increases with the unobservability of the agent's actions.

Holmström's informativeness principle and extensions

Analytical research with respect to the use of performance measures goes back to the article by Holmström (1979), who extends the results introduced by Mirrlees (1974, 1976). Holmström's finding is known as the informativeness principle, and it is intensively used in accounting research. The informativeness

[5] The inherent conflict of interest is reflected by the work aversion of the agent, i.e., the personal cost of effort.

principle states that only those performance measures are valuable that are informative about the agent's actions. This means that the performance measure should be sensitive to the 'level' of effort. If the principal can choose from a portfolio of performance measures, $x_1,...,x_n$, then the performance measures for which the following formal statement applies, should be used for incentive purposes

$$\frac{\partial \quad f_a(x_1, x_2, ..., x_n \mid a)}{\partial x_i \quad f(x_1, x_2, ..., x_n \mid a)} > 0$$

in which x_i is a performance measure and $f_a(\cdot)/f(\cdot)$ is the MLRC. This statement indicates that higher levels of x_i are associated with higher levels of effort, given all $x \neq x_i$. The principal can use performance measure x_i to provide the agent with incentives to exert effort. If the above partial derivative is equal to zero, then the performance measure is not informative about the agent's actions and therefore useless for incentive purposes.

Thus, the informativeness principle gives an indication of which performance measures are valuable and which are not. However, knowing the performance measures to be used for incentive purposes does not answer the question of how much weight to put on each measure. Banker and Datar (1989) extend the results of Holmström (1979) and examine the optimal incentive weights. In order to describe their results, I apply the linear P/A model (Holmström and Milgrom 1987, 1991).[6] Assume that the agent is given a linear incentive contract of the following form

$$s(x) = \alpha + \beta x$$

where α is a fixed wage, β is the incentive weight, and x is the performance measure. Furthermore, the performance measure is characterized by

$$x = fa + \theta$$

where a is the action of the agent, f is the marginal impact of the agent's action on the performance measure x, and θ reflects the impact of uncontrollable factors, with $\theta \sim N(0,\sigma^2)$. More specifically, Banker and Datar (1989) label f

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[6] Banker and Datar (1989) do not apply the linear P/A model. However, with respect to the characterization of the incentive weight, the linear P/A model yields results identical to those of Banker and Datar (1989). See appendix A for a description and discussion of the linear P/A framework.

'sensitivity' and σ^2 *'noise'*.[7] They state that a performance measure is valuable if it is sensitive to the level of effort (cf. Holmström 1979) but that the weight will be small if it is noisy. Therefore, Banker and Datar's 'sensitivity' is similar to Holmström's 'informativeness' and, in order to avoid confusion, I restrict myself to using the term 'informativeness' in the remainder of this dissertation.

Given the assumptions of the model, the incentive weight is characterized by (see appendix A)

$$\beta = \frac{f^2}{f^2 + r\sigma^2}$$

where r is the agent's coefficient of constant absolute risk aversion (CARA). The effect of the performance measure characteristics, informativeness and noise, on the incentive weight can be examined by computing partial derivatives. These partial derivatives indicate that the incentive weight increases with informativeness and decreases with noise (see appendix A).

Consistent with most of the analytical research, the above model assumes that the performance measure x is also the outcome relevant for the principal. Feltham and Xie (1994) usefully extend the analytical literature by examining situations in which the outcome relevant for the principal cannot be contracted upon because, for example, the full consequences of the agent's actions are not observable in the short-term. This relates to the issue of performance measure *congruence*. To analyze this situation, Feltham and Xie (1994) assume that the agent can take two actions, a_1 and a_2. Further, they assume that the outcome x, which is relevant for the principal, cannot be jointly observed and therefore the incentive contract depends on performance measure y. The outcome x and performance measure y are characterized by

$$x = f_1 a_1 + f_2 a_2 + \theta_x$$
$$y = g_1 a_1 + g_2 a_2 + \theta_y$$

Performance measure y is congruent if it provides an effort allocation over the two actions that is identical to the effort allocation that would be provided by the outcome x. The effort allocations of outcome x and performance measure y are respectively

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[7] Assuming that the possible outcomes of x are normally distributed, then 'sensitivity' indicates the extent to which increases in effort increases the *mean* of the Normal Distribution, while 'noise' indicates the *variance* of the Normal Distribution. See appendix A for a graphical representation.

$$\frac{a_1''}{a_2''} = \frac{f_1}{f_2} \quad ; \quad \frac{a_1'}{a_2'} = \frac{g_1}{g_2}$$

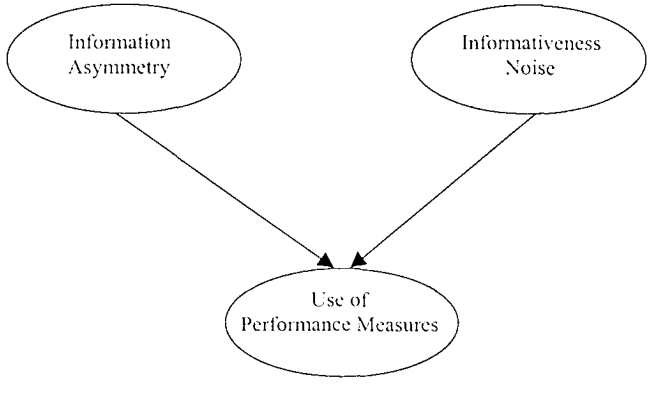
Based on these effort allocations, Feltham and Xie (1994) characterize performance measure congruence by

$$\delta = [f_1 g_2 - f_2 g_1]^2$$

The higher δ the more the effort allocation of performance measure y differs from that of outcome x and thus the less congruent the performance measure is. Subsequently, they show that the use of non-congruent performance measures leads to suboptimal effort allocation, which decreases the value to the 'agency'. However, because the incentive weight cannot be written as a function of δ in their model, it is impossible to examine the effect of congruence on the incentive weight.

In summary, the P/A model analyzes the design of incentive contracts and identifies the factors that are relevant for this design. The results of the P/A model indicate that incentive contracts are designed when information asymmetry exists and that informativeness, noise, and congruence are relevant for the design. However, informativeness and noise are the only performance measure characteristics that have a 'predictable' impact on the use of performance measures in the sense that an increase in informativeness (noise) of a performance measure leads to an increase (decrease) in its use. Given the purpose of this dissertation to explain the use of performance measures, I therefore focus on these two performance measure characteristics. Figure 3.1 summarizes the agency theory focus on the use of performance measures.

Figure 3.1
Agency theory focus on the use of performance measures



3.2.2 Behavioral focus

Behavioral research in accounting goes back to the fifties and starts with a study by Argyris (1952), who examines the impact of budgets on people. Subsequent behavioral studies on the use and effects of budgets are, for example, Hofstede (1967) and DeCoster and Fertakis (1968). The more recent behavioral focus on incentive systems, represented by the RAPM studies, is based on contingency theory, which stems from the organizational literature. In order to describe this focus, I first discuss the control framework of Ouchi (1979) and then turn to contingency theory.[8]

Ouchi's control framework

Ouchi (1979) describes a simple conceptual framework for the design of control systems. He begins his paper with stating that:

> *'The problem of organization is the problem of obtaining cooperation among a collection of individuals or units who share only partially congruent objectives'* (p. 833).

In other words, there is a lack of goal congruence between subordinates and superiors and control systems need to be implemented to make sure that the organization moves towards its objectives. Two different types of control strategies can be used for this purpose. First, the control system can focus on performance evaluation (outcomes), which emphasizes monitoring, measuring and evaluating 'performance'. Second, the control system can focus on reducing the divergent preferences of the organizational participants, which emphasizes selection, training, and socialization. These two control strategies are interrelated in the sense that divergent preferences can be tolerated by the organization if the performance evaluation system is 'precise', while 'imprecise' performance evaluation systems can be tolerated if preferences almost converge (Ouchi 1979).

The choice between the two control strategies critically depends on the ease with which performance can be measured and evaluated. Ouchi's framework, presented in figure 3.2, suggests the following. Within the strategy of performance evaluation, either behavior can be measured or the outcome of those behaviors, i.e., behavior measurement or output measurement. Behavior measurement can be used if the knowledge of the transformation process is perfect. In this case, tasks can be programmed and behaviors can be explicitly defined, measured, and evaluated. On the other hand, output measurement can

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[8] Ouchi's (1979) framework specifically addresses the conditions that affect the feasibility of different controls and is based on the work of Thompson (1967) on uncertainty.

be used if the organization is able to measure the outputs of behavior. The use of behavior versus output measurement depends on the information characteristics of the task (Eisenhardt 1985). If the knowledge of the transformation process is imperfect and there exists no ability to measure outputs, then the performance evaluation strategy is not feasible. The organization faced with these circumstances has to rely on socialization processes, labeled 'clan' control, to reduce the divergence of preferences.

Figure 3.2
Ouchi's framework of the determinants of control system design

		Knowledge of the transformation process	
		Perfect	Imperfect
Ability to measure outputs	High	Behavior and output measurement	Output measurement
	Low	Behavior measurement	'Clan' control

Ouchi (1979) argues that because performance evaluation will never be precise and individuals' goals will never be perfectly congruent, organizations have to find that:

> *'...balance of socialization and measurement which most efficiently permits a particular organization to achieve cooperation among its members'* (p. 846).

As the conceptual framework shows, this most efficient balance is different for organizations with different information characteristics.

Contingency theory

The observation that a particular control system is more suited for some organizations than for others, is the core issue of contingency theory. Contingency theory stems from the organization literature and more specifically from the studies by Burns and Stalker (1961), Woodward (1965), Lawrence and Lorsch (1967), Thompson (1967), and Perrow (1970). In general, the contingency theory of organization assumes that there is no single organizational structure that is best for all organizations. For example, organizations facing more dynamic and uncertain environments have a need to decentralize responsibilities in order to cope with these circumstances. As a result, the

contingency theory of organization predicts that environmental conditions affect organizational design.

The application of contingency theory in management accounting is partly due to its predecessor in the organization literature and partly due to conflicting empirical evidence (Otley 1980).[9] The management accounting equivalent of contingency theory simply states that there is no universally appropriate accounting system. More specifically, Otley states that:

> *'... a contingency theory must identify specific aspects of an accounting system which are associated with certain defined circumstances and demonstrate an appropriate matching'* (1980, p. 413).

For example, the 'specific aspect' of an accounting system is the use of accounting performance measures, while the 'defined circumstances' is environmental uncertainty. What constitutes an 'appropriate matching', however, is ill defined. This is reflected by a large number of studies that discuss and comment on alternative forms of fit (e.g., Schoonhoven 1981; Drazin and Van de Ven 1985; Venkatraman 1989; Hartmann and Moers 1999). However, Hartmann (1997) claims that the contingency theory of the appropriateness of accounting performance measures is not a theory of 'choice' but a theory of 'effects'. That is, it takes the use of accounting performance measures as given and examines its behavioral effects under different circumstances. As a result, fit in this literature can be defined as follows:[10]

> *The effect of the use of accounting performance measures on the incidence of subordinates' functional behavior is higher in situation X than in situation Y.*

This description of fit reflects the general prediction underlying the RAPM studies, where the situation 'X' and 'Y' is determined by the contingency variable chosen.

The dominant contingency factor used in both the contingency theory of organization and the contingency theory of management accounting is uncertainty (see e.g., Galbraith 1977; Hartmann 2000). Uncertainty is assumed to affect the *controllability* of accounting performance measures in the sense

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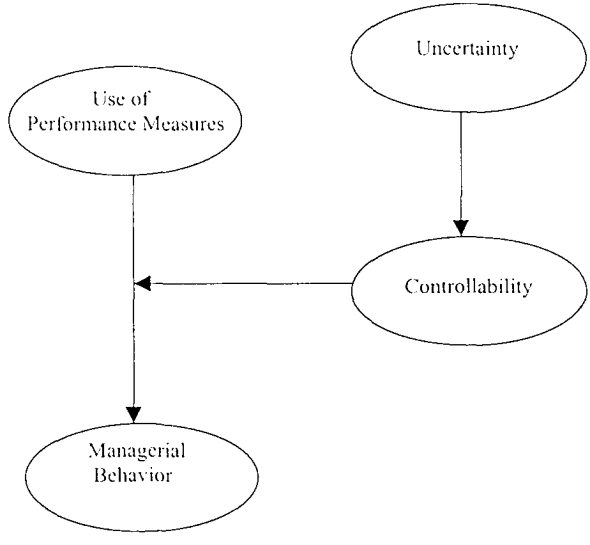
[9] An incentive example of this is the contingency literature on reliance on accounting performance measures (RAPM), which tries to solve the 'conflicting' empirical results of Hopwood (1972) and Otley (1978) (Kren and Liao 1988).

[10] This description of fit in the RAPM literature is consistent with the literature's excessive use of 'moderated regression analysis' (see Hartmann and Moers 1999).

that these performance measures are less controllable the greater the uncertainty. The controllability principle, which is paramount in the RAPM literature (Hartmann 2000), states that managers should only be held responsible for things they can control. If managers are held responsible for things they cannot control, they will experience distress, which leads to decreased *'job satisfaction'* and increased *'job related tension'*. The reason why managers will experience distress is that uncontrollable performance measures are affected by factors beyond their control, which leads to disagreement with the evaluation criteria being used and perceptions of 'unfairness'. As a result, the RAPM studies predict that the effect of RAPM on, for example, job-related tension is more positive for higher levels of uncertainty.

In summary, contingency theory, *as applied in RAPM studies*, focuses on the effects of RAPM and RAPM is treated as an exogenous variable. Finally, the predictions underlying these studies are predominately based on uncertainty and how uncertainty affects the performance measure characteristic controllability. Figure 3.3 summarizes the RAPM contingency focus on the use of performance measures.

Figure 3.3
RAPM contingency focus on the use of performance measures



3.2.3 Explaining the use of performance measures

The overview of the empirical literature in chapter 2 indicated that there is little evidence of the factors explaining the use of performance measures at the subordinate level. Furthermore, I stated that methodological issues drive this

lack of attention not theoretical. The original contingency studies in the organization literature are concerned with how environmental conditions affect the design of organizations. In other words, they examine the factors that explain differences between organizations in terms of their design. Similarly, the first contingency studies in accounting are concerned with examining the factors that explain the design of accounting information systems. These studies include both empirical papers (e.g., Bruns and Waterhouse 1975; Hayes 1977) and theoretical papers (e.g., Gordon and Miller 1976; Waterhouse and Tiessen 1978). These studies therefore treat the contingency factors as 'antecedent' variables, which affect the design of accounting systems. In his critical review of the contingency studies in accounting, Otley (1980) states that what is missing in almost all of these studies is an outcome variable that reflects organizational effectiveness. However, the 'minimum necessary contingency framework' that Otley proposes still contains the basic assumption that the contingency variables affect the design of accounting systems. It is therefore surprising that the RAPM studies treat the 'accounting system' only as an exogenous variable and the contingency variables as 'moderators'. Although treating RAPM as an endogenous variable and the contingency variable as a moderator is consistent with the type of fit previously described, I propose that this type of fit is the *result* of using moderated regression analysis. That is, rather than letting a theoretically derived type of fit determine the statistical test, the statistical test has determined the type of fit used in the RAPM literature. Most of the RAPM studies have been concerned with, what is called, the 'search for the magic moderator' instead of being concerned with having a solid theoretical basis. An implicit assumption underlying the RAPM studies is that:

> *'...many organizations (or individuals or subunits) that 'should' use a particular management accounting practice in fact do* ***not*** *do so, but instead use a practice that reduces performance or increases stress, conflict, misrepresentations, etc.'* (Luft and Shields 2000).

Why this 'out-of-equilibrium-type condition' is assumed, is left unexplained. More importantly, contingency theory, at least implicitly, assumes an 'equilibrium-type condition'. Why has the RAPM literature moved away from this assumption? Why has this literature not applied the basic premise of contingency theory and try to explain the 'conflicting' results of Hopwood (1972) and Otley (1978) with respect to differences in RAPM between both samples?[11] I prefer to be consistent with the theory and examine the factors that

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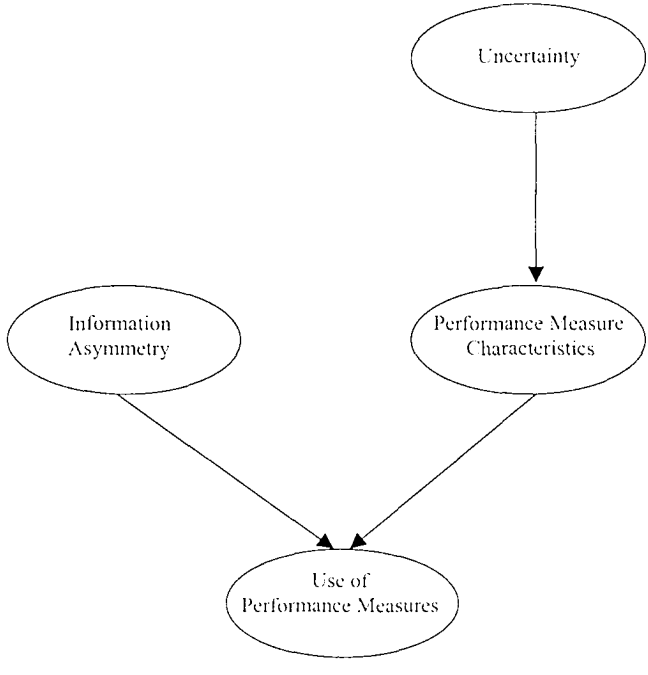
[11] In Hopwood's sample 44% of the managers was evaluated using 'non-accounting' information, while in Otley's sample only 3% of the managers was evaluated in this way.

are related to the use of performance measures under the assumption that most superiors that 'should' use a particular performance measure in fact do so (cf. Luft and Shields 2000). Even if equilibrium is not achieved but there is a 'move-to-equilibrium', this 'move' should be observable. If this equilibrium assumption is incorrect, the study will simply fail to find the predicted results (Luft and Shields 2000).

Given the above explanation for the lack of attention given to explaining the use of performance measures, I think it is useful to return to the basic premise of contingency theory and examine the effect of uncertainty, being the dominant contingency factor, on the design of incentive systems. Since uncertainty is assumed to affect the characteristics of performance measures, it is further useful to incorporate the implications of agency theory because agency theory can be used to specify the characteristics of performance measures that are relevant for designing incentive systems (Lambert and Larcker 1987). In Part A of chapter 4, I therefore combine the implications of contingency theory and agency theory to develop hypotheses regarding the factors that explain the use of financial and non-financial performance measures. Figure 3.4 presents the framework for subsequent analysis.

Figure 3.4
Framework for studying the use of performance measures



3.3 The Use and Effects of Performance Targets

3.3.1 Economic focus

It is difficult to describe the economic focus on performance targets since economists almost always neglect this component of the incentive system (for a similar remark see Merchant et al. (2000)). Traditionally, the outcome of the P/A model presents an optimal incentive contract based on some measure of performance and the agent is told to 'do his best', i.e., maximize the value of that particular performance measure. In other words, performance targets do not play a role in traditional P/A models.

The only economic analysis of performance targets relates to the ratchet principle introduced by Weitzman (1980). The ratchet effect occurs when the performance target in year $t+1$ is adjusted upward when actual performance exceeds targeted performance in year t. Therefore, the agent is rewarded for improved performance in year t through higher bonuses, but penalized through more difficult performance targets in year $t+1$. The agent trades-off increased bonuses with higher targets, which results in decisions that lead to less performance variability. However, the ratchet principle does not indicate how targets should be set in the first place or when and why ratcheted targets should be used. It only indicates how the agent is expected to react when an unknown target is ratcheted. As a result, the economic focus does not provide any clues with respect to the use and effects of performance targets *per se*.

3.3.2 Behavioral focus

The behavioral focus on performance targets can be analyzed by describing the theory underlying the target difficulty studies, i.e., goal setting theory.[12] The basic premise of goal setting theory is that goals are immediate regulators of human action. Therefore, goal setting affects behavior and subsequently performance. There are two implications of goal setting theory that are relevant for this dissertation. First, goal setting theory states that there is a linear relationship between goal difficulty and performance. This linear relationship is presented in figure 3.5 and is labeled the *goal difficulty function*. The goal difficulty function indicates that when goals become more difficult, performance will increase. A large number of experimental studies have consistently shown the presence of this linear function, although the function levels off when goal difficulty is so high that the subjects reach the limits of their ability.[13]

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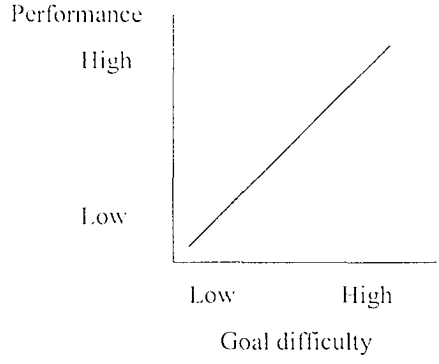
[12] For a complete discussion of goal setting theory, I refer to Locke and Latham (1990).

[13] The goal difficulty function presented in figure 3.5 therefore portrays a narrow range of goal difficulty. The 'complete' function is non-linear (see e.g., Merchant (1998, p. 388)).

Figure 3.5
Goal difficulty function



The second implication of goal setting theory is that specific, hard goals lead to a higher level of performance than vague goals, such as 'do your best' or no goals at all.[14] This implication of goal setting theory has also convincingly been shown in a large number of experimental studies. The general explanation for the prediction that specific, hard goals lead to higher performance than vague, 'do your best' goals is as follows. The ambiguity underlying 'do your best' goals gives people the opportunity to interpret any level of performance as consistent with doing one's best. People will therefore be more satisfied with a given level of performance, even though they could have performed even better. Specific, hard goals, on the other hand, only provide one single goal that needs to be beaten. People will therefore only be satisfied if they beat that particular hard goal and will strive for attaining that particular goal.

Although goal setting theory states that (more difficult) goals affect performance, the question still remains why this relationship exists. That is, what mechanisms ensure that goals improve performance? Locke and Latham (1990) describe two different mechanisms, i.e., universal task strategies and task specific strategies. The universal task strategies consist of three relatively direct mechanisms, (1) direction of attention, (2) effort, and (3) persistence, which relate to the attributes of motivated action.[15] First, goals direct attention to those activities for which goals have been assigned. Activities for which no goals have been assigned are interpreted as less relevant and the attention of the individual is therefore focused on goal-relevant activities. Furthermore, more specific goals

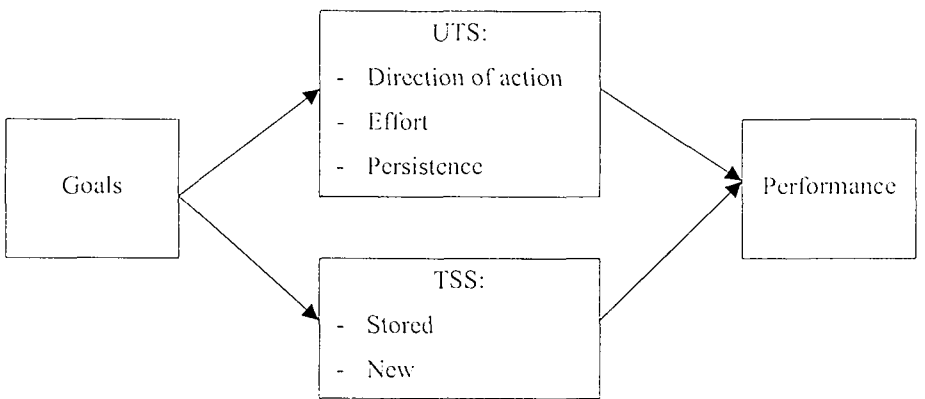
[14] No goals can be interpreted as implicit 'do your best' goals.
[15] The attributes of motivated action are direction (choice), intensity, and duration (Locke and Latham 1990, p. 261).

make it easier for individuals to direct their attention than more general goals. Obviously, performance will improve on dimensions that have the attention of the individual in question. Second, assuming sufficient ability, the more demanded from an individual, the greater the expended effort. Since a more difficult goal demands more from an individual, goal difficulty has a positive effect on the expended effort, which has a positive effect on performance. Third, given goal commitment, individuals will continue to expend effort until the assigned goal is attained. That is, goals lead to a persistence of expended effort over a certain period of time, where more difficult goals lead to greater persistence and thus higher performance.

Goal setting also improves performance more indirectly through its effect on task specific strategies. Two different types of task specific strategies exist: stored task specific strategies and new task specific strategies. Stored task specific strategies relate to the skills of an individual and are due to learning and experience with respect to a specific task. New task specific strategies relate to the development of new ways to solve problems not encountered before in order to cope with these problems. Goal setting affects performance in an indirect way in that it leads to the development and/or execution of task specific strategies.

In summary, goal setting affects performance through its effect on universal task strategies and task specific strategies. This relationship is graphically displayed in figure 3.6.

Figure 3.6
Mediating mechanisms of goal-performance relationship



Notes:
[a] UTS: Universal Task Strategies
TSS: Task Specific Strategies

Finally, since performance targets are goals, the predictions of goal theory with respect to the effects of goals in general apply equally well to the effects of performance targets in incentive systems. That is, performance is higher when performance targets are used compared to when they are not used. Further, a more difficult performance target increases performance through its effect on, for example, effort. More generally, goal setting theory predicts that performance targets have significant incentive effects.

3.3.3 Examining the effects of incentive systems

Combining the implications of agency theory and goal theory, with respect to the effects of incentive systems, leads to the following observations. First, agency theory predominantly ignores the use and effects of performance targets in incentive systems. At best it can be stated that it assumes the assignment of 'do your best' goals. Goal theory, on the other hand, shows that performance targets have significant incentive effects and that the assignment of specific, hard goals leads to higher performance than the assignment of 'do your best' goals. This implies that simply using performance measures for incentive purposes without emphasizing performance targets might not be very efficient, in terms of providing sufficient incentives to promote certain types of behavior.

Second, the effects of performance targets, as predicted by goal theory, are similar the effects of performance measures, as predicted by agency theory. For example, goal theory states that goals direct attention to goal-relevant activities and increase effort. Similarly, the P/A model states that managers direct their attention to those aspects of the job that are being measured and expend more effort on these activities. The question can then be raised how performance measures and performance targets are related and which component of the incentive system actually affects behavior.

Finally, although goal theory predicts that more difficult goals improve performance, it decreases the probability of attaining targeted performance. Applying this to an incentive situation implies that managers are less likely to receive their 'incentive payment' when targets become more difficult. From an economic perspective, this means that managers have to bear increased risks when performance targets are more difficult, which affects the trade-off between incentives and risk sharing.

Given the above discussion and the literature's emphasis on the incentive effects of performance measures, I think it is useful to combine the implications of agency theory and goal theory to examine the effects of incentive systems, which include performance measures *and* performance targets. In Part B of chapter 4, I therefore use agency theory and goal theory to develop hypotheses regarding the effects of performance measures and performance targets on managerial behavior.

chapter 4

THE USE AND EFFECTS OF PERFORMANCE MEASURES AND PERFORMANCE TARGETS: HYPOTHESES DEVELOPMENT

4.1 Introduction

In the previous chapter, I indicated that it could be fruitful to combine the implications of the economics-based literature and the behavioral-based literature to study the design and effects of incentive systems. In this chapter, I develop hypotheses based on the implications of agency theory, contingency theory, and goal theory. The development of hypotheses is split into two parts. The first part relates to the factors that explain the use of performance measures for incentive purposes, while the second part relates to the incentive effects of performance measures and performance targets. More specifically, as stated in the introductory chapter, I focus on three types of performance measures: (1) financial performance measures, (2) internal non-financial performance measures, and (3) external non-financial performance measures.[1] In Part A, I develop hypotheses related to the factors that explain the use of these three types of performance measures. In Part B, I develop hypotheses related to the effect of financial and external non-financial performance measures and performance targets on managerial short-term orientation.

[1] See chapter 1 for definitions of these types of performance measures.

Part A

4.2 The Use of Performance Measures

4.2.1 Introduction

In the following section, I discuss the effect of information asymmetry and performance measure characteristics on the use of the three types of performance measures. Further, I examine how the performance measure characteristics are affected by uncertainty. Following the discussion in chapter 3, there are three reasons for focusing on information asymmetry, performance measure characteristics and uncertainty. First, the type of incentives used depends on the level of information asymmetry, where increased information asymmetry increases the need for output measurement, which is the focus of this dissertation. Second, performance measure characteristics, such as controllability, informativeness, and noise, underlie most predictions in incentive studies in accounting. Although the theoretical predictions are based on performance measure characteristics, no structured attempt has been made so far to actually incorporate these characteristics in empirical research. Third, uncertainty is the core concept upon which organizational design frameworks are based (Galbraith 1977). Hartmann (2000) states that uncertainty is the underlying variable of most empirical studies investigating the use and effects of financial performance measures. Furthermore, he states that the effects of uncertainty are not well-understood (Hartmann 2000, p. 471).

4.2.2 Hypotheses

Both the economics-based literature and the behavioral-based literature either explicitly or implicitly state that the performance measure characteristics should explain the use of performance measures and that performance measures should be used when behavior cannot be observed or measured. In this dissertation, I examine the effect of information asymmetry, informativeness, controllability, and measurement accuracy on the use of performance measures. Furthermore, I examine the effect of task uncertainty on informativeness and environmental uncertainty on controllability.

Information asymmetry (decision-making authority)

The reason why firms design compensation contracts based on performance measures instead of on managerial actions is because managerial actions cannot be observed, they are too costly to observe, or because superiors cannot interpret what they are observing. This information asymmetry due to the 'unobservability' of managerial actions increases the need for performance measures. Information asymmetry occurs when decision rights are allocated

downward in the organization, i.e., decision-making authority is decentralized. This increase in decision-making authority creates a need to evaluate the outcomes of the decisions made lower in the organization. Decision-making authority, as a proxy for information asymmetry, will therefore lead to a demand for performance measurement and the use of any feasible performance measures available. However, increased decision-making authority also increases the demand for more aggregate information (Chenhall and Morris 1986). Providing managers with more decision-making authority implies that managers will take more actions, which results in increases in information asymmetry. Since it is too costly to have performance measures for each type of action (Banker and Datar 1989; Ittner and Larcker 1999), there exists an increased preference for more aggregate performance measures, i.e., performance measures that provide (some) information about an increased 'number' of actions. Financial performance measures are more aggregate than both internal and external non-financial performance measures, since the outcomes of all actions finally need to end up in the financial results. This implies that the usefulness of financial performance measures increases, while the usefulness of the non-financial performance measures decreases as decision-making authority increases. As a result, information asymmetry has a differential effect on the use of the three types of performance measures. The *existence* of information asymmetry, due to the allocation of decision rights, has a positive effect on the use of all three types of performance measures, while the need for aggregation, due to *increased* information asymmetry, has a positive effect on the use of financial performance measures and a negative effect on the use of internal and external non-financial performance measures. Because it is unclear *a priori* whether the 'information asymmetry aspect' or the 'aggregation aspect' will dominate, no directional hypotheses can be stated with respect to the non-financial performance measures. The above arguments lead to hypotheses 1a-1c.

H1a: Decision-making authority (i.e., the resulting information asymmetry) increases the use of financial performance measures.

H1b: Decision-making authority (i.e., the resulting information asymmetry) is not related to the use of internal non-financial performance measures.

H1c: Decision-making authority (i.e., the resulting information asymmetry) is not related to the use of external non-financial performance measures.

Performance measure characteristics[2]

Previous studies have used a number of performance measure characteristics in developing hypotheses. As described in chapter 3, from an economic point of view, the performance measure characteristics informativeness and noise have a predictable impact on the use of performance measures. Informativeness is defined as the marginal contribution of the manager's actions to the expected outcome of a performance measure. Noise, on the other hand, is defined as the variance in the outcome of a performance measure due to 'random events'. Obviously, these characteristics have a specific meaning in principal-agent models. However, intuitively informativeness relates to the degree to which manager's decisions have an impact on performance, while noise relates to the degree to which uncontrollable factors have an impact on performance. The greater the informativeness, the more weight is put on the performance measure, while the greater the noise, the less weight is put on the performance measure.

The performance measure characteristic discussed in chapter 3 that is used in behavioral-based research is controllability. The controllability principle states that managers should only be held responsible for things they can control (Merchant 1989). That is, the manager should not be held responsible for the impact of uncontrollable factors on performance. The greater the impact of the uncontrollable factors, the lower the controllability and the less emphasis should be put on that particular performance measure. Although noise is specifically defined in principal-agent models, the intuitive interpretation is identical to that of controllability and both are sometimes even used as synonyms (see e.g., Merchant 1989, p. 87).

In an extensive field study, Merchant (1989) finds that the controllability principle is not strictly applied in practice. He concludes that the most important factor explaining the use of performance measures is the degree of influence the manager has, irrespective of the impact of uncontrollable factors (Merchant 1989, p. 106). That is, if the manager's decisions have an impact on the outcome of the performance measure, then that performance measure will be used for incentive purposes. These results are consistent with the more intuitive interpretation of informativeness described in the principal-agent models. It further suggests that informativeness and noise/controllability are two separate performance measure characteristics.

Finally, Merchant (1989) identifies a performance measure characteristic that has received almost no attention in the empirical literature, i.e., *measurement accuracy*. Measurement accuracy consists of two components: *verifiability* and *objectivity*. Verifiability means that the measures can be

[2] This section contains a repetition of a part of chapter 3 for reasons of clarity.

'substantially duplicated by independent measurers using the same measurement methods' (Merchant 1989, p. 26), i.e., the measurement dispersion is small. Objectivity, on the other hand, means that the measurement is 'free from personal bias' (Merchant 1989, p. 26). Inaccurate performance measures make it more difficult to elicit the manager's performance from the measure and should therefore be used less. Notice that this prediction is identical to that with respect to the impact of uncontrollable factors. However, there is a conceptual difference between accuracy and noise/controllability in the sense that the first is due to the measurement process, while the second is due to factors affecting the outcomes of day-to-day operations.

Although all of the performance measure characteristics described above are different in a strict sense, there are some important similarities. In general, for the purpose of examining the factors that explain the use of performance measures, a distinction can first of all be made between (1) the impact that a manager has on performance and (2) the impact that uncontrollable factors have on performance. This implies that 'performance' can be characterized by (see chapter 3)

$$x = fa + \theta$$

The third and last general performance measure characteristic is the degree to which the performance measure is objective and verifiable, which implies that the performance measure (x^m) measures performance with error (cf. Hemmer 1996a), i.e.,

$$x^m = x + \varepsilon$$

Therefore, the performance measure can be characterized by

$$x^m = fa + \theta + \varepsilon$$

In summary, the previous discussion indicates that there are three general performance measure characteristics, which I label (1) informativeness, (2) controllability, and (3) measurement accuracy.[3]

Following the economics-based literature and the behavioral-based literature, I predict that the use of performance measures depends on the performance measures' characteristics. More specifically, informativeness,

[3] I use the labels 'informativeness' and 'controllability' to make a clear distinction between the performance measure characteristic emphasized in respectively the economics-based literature and behavioral-based literature.

controllability, and measurement accuracy increases the use of the performance measure in question. These predictions are summarized in hypotheses 2a-2c.

H2a: the use of financial performance measures increases with their (i) informativeness, (ii) controllability, and (iii) measurement accuracy.

H2b: the use of internal non-financial performance measures increases with their (i) informativeness, (ii) controllability, and (ii) measurement accuracy.

H2c: the use of external non-financial performance measures increases with their (i) informativeness, (ii) controllability, and (ii) measurement accuracy.

Uncertainty

Uncertainty is one of the most important variables in organizational design frameworks and it is also the dominant concept in performance evaluation and compensation research. The literature makes a distinction between two types of uncertainty based on its source, i.e., *environmental uncertainty* and *task uncertainty* (e.g., Fisher 1995; Hartmann 2000). Environmental uncertainty is defined as the uncertainty due to factors in the organization's environment, while task uncertainty is defined as the uncertainty due to the complexity and diversity of the task performed. These constructs have predominantly been used in the behavioral-based literature, although related constructs are available in the economics-based literature (Ittner and Larcker 2000). The general assumption made in the literature is that both environmental uncertainty and task uncertainty negatively affect the usefulness of financial performance measures because both types of uncertainty decrease the controllability of these measures. However, there are two problems with this assumption. First of all, empirical research has not always made a distinction between environmental uncertainty and task uncertainty (Hartmann 2000) and it is not at all clear if both types of uncertainty affect the controllability of financial performance measures. Second, an implicit assumption underlying this stream of research is that the two types of uncertainty have no effect or a positive effect on alternative performance measures. Below, I argue that the two types of uncertainty have an effect on different characteristics of financial performance measures and that these effects also *partly* apply to non-financial performance measures. I first discuss the effect of task uncertainty on informativeness and subsequently the effect of environmental uncertainty on controllability.

Task uncertainty is a job characteristic that reflects the complexity and diversity of the task performed. The RAPM literature has assumed that high task

uncertainty situations are, in part, characterized by an increase in the performance impact of factors beyond the control of the manager, which decreases the usefulness of (accounting) performance measures. However, I propose that this interpretation of task uncertainty is incorrect and mainly due to the literature's inability to clearly distinguish between different types of uncertainty (Hartmann 2000).[4] Increased task uncertainty indicates more uncertainty about the way in which a certain objective should be achieved. This does not mean that 'other factors' have more influence on performance, but rather that the actions chosen by managers are crucial to task performance. Locke and Latham (1990, p. 260) state that:

> *'...in more complex tasks, the plans, tactics, and strategies used by the individual play a larger role in task performance than they do in simpler tasks where the number of different strategies is more limited and are generally known to all performers.'*

Lambert and Larcker (1995) make similar arguments in a study examining compensation contracts for senior-level hospital administrators. They state that:

> *'Hospitals with complex service offerings to the patient are inherently more difficult to manage. As a result, the profitability of these hospitals is more* ***sensitive*** *to the amount of effort provided by the hospital administrator'* (emphasis added).

Thus, in more complex and diverse tasks, the manager's decisions are of greater importance to task performance. However, the degree to which task uncertainty increases the ability of managers to improve performance, i.e., increase informativeness, depends on what measure of performance is used. If the performance measure is internal oriented and related to the task, the time-span between providing effort and observing performance becomes shorter, which increases the ability of managers to see how their efforts translate into performance. Related to this issue is that the ability of managers to improve performance is increased by the amount of feedback they receive. Feedback information facilitates learning and allows managers to update their strategies, which makes performance more effort-sensitive (Sprinkle 2000). As a result, task uncertainty increases the informativeness of those performance measures

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[4] Hirst (1983), for example, measures 'task uncertainty' by combining scales that reflect both task uncertainty and environmental uncertainty. Similarly, Brownell (1985) uses the functional area of managers to reflect differences in both task uncertainty and environmental uncertainty.

that are internal oriented and for which feedback can be provided on a frequent basis. The conditions of internal orientation and provision of frequent feedback are present in the internal non-financial performance measures and to a lesser extent also in the financial performance measures, but are absent in the external non-financial performance measures. Therefore, task uncertainty increases the informativeness of both financial and internal non-financial performance measures, but is not related to the informativeness of external non-financial performance measures. These predictions are summarized in hypotheses 3a-3c.

H3a: task uncertainty increases the informativeness of financial performance measures.

H3b: task uncertainty increases the informativeness of internal non-financial performance measures.

H3c: task uncertainty is not related to the informativeness of external non-financial performance measures.

As already stated above, environmental uncertainty is assumed to decrease the usefulness of financial performance measures because it decreases the controllability of these measures. Environmental uncertainty increases the unpredictable impact of uncontrollable factors on performance, which makes it more difficult to judge ex-post whether good or bad financial performance is due to changing environmental conditions or due to managerial performance. Although this argument seems to be valid, there is no reason to assume that this relationship only applies to financial performance measures. It is very likely that this relationship also applies to the internal and external non-financial performance measures. For example, unpredictable changes in customers' behavior can have an uncontrollable impact on the degree to which these customers are satisfied with the firm's products and services, which might consequently affect market share. In a similar vein, technological developments and changes in suppliers' behavior can have an uncontrollable impact on the efficiency and effectiveness of the task performed. As a result, internal and external non-financial performance measures contain the same defects as financial performance measures in the sense that increased environmental uncertainty decreases the controllability of these performance measures. These predictions are summarized in hypotheses 4a-4c.

H4a: environmental uncertainty decreases the controllability of financial performance measures.

H4b: environmental uncertainty decreases the controllability of internal non-financial performance measures.

H4c: environmental uncertainty decreases the controllability of external non-financial performance measures.

Part B

4.3 The Effects of Performance Measures and Performance Targets

4.3.1 Introduction

In this part of chapter 4, I develop hypotheses regarding the effect of (non-)financial performance measures and performance targets on managerial short-term orientation.[5] Managerial short-term orientation is defined in this dissertation as an orientation towards short-term *financial* results. Consequently, 'short-term incentives' imply incentives to improve short-term financial results, while 'long-term incentives' imply incentives to improve long-term financial results.

The number of firms using non-financial performance measures for incentive purposes is increasing (Banker et al. 2000). Although there are a number of reasons why firms use non-financial performance measures, the primary reason is that some of them are leading indicators of financial performance (Kaplan and Norton 1992). That is, compensation based on non-financial performance measures provides managers with incentives to improve long-term financial performance, i.e., decrease managerial short-term orientation. Financial performance measures, on the other hand, are predominantly 'backward-looking' and lack predictive ability to explain future performance and therefore provide managers with incentives to improve short-term financial performance, i.e., short-term incentives. However, despite the increased use of non-financial performance measures and the above 'claims', the literature review in chapter 2 shows that there is only little empirical evidence of the effects of these performance measures on managerial short-term orientation.

Chapter 2 further shows that the accounting literature on incentives predominantly focuses on the use and effects of performance measures and neglects another important component of incentive systems, i.e., performance targets. Firms usually set explicit targets for managers and evaluate performance compared to target (Merchant et al. 2000). The type of target used can have a

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[5] Although managerial short-term orientation is only one aspect of managerial behavior, it dominates the theoretical and empirical accounting literature on incentive systems (e.g., Govindarajan and Gupta 1985; Lambert and Larcker 1987; Feltham and Xie 1994; Hemmer 1996a; Banker et al. 2000). Therefore, I focus on this type of behavior.

significant impact on performance and managerial behavior. For example, Merchant et al. (2000) state that the effect of incentives is likely to be dependent on performance target difficulty. Alternatively, more difficult targets increase the risk the managers have to bear and less difficult targets may be the outcome of the trade-off between incentives and risk sharing when managers are risk averse (Merchant and Manzoni 1989). However, the empirical evidence of the use and effects of difficult performance targets in general is limited and no empirical evidence exists with respect to the use and effects of non-financial performance targets.

4.3.2 Hypotheses

One of the primary reasons for incorporating non-financial performance measures is that some of them are leading indicators of financial performance and provide managers with incentives to be long-term oriented (Ittner and Larcker 1998b). In the following, I focus on external non-financial performance measures because empirical research indicates that these measures are leading indicators of financial performance and should therefore provide managers with long-term incentives (Ittner and Larcker 1998a; Banker et al. 2000).[6] For example, increasing customer satisfaction requires a manager to focus on providing service, which leads to repeat purchases and thus to improving long-term profitability (Hemmer 1996a). This long-term orientation is relatively absent in the incentives provided by financial performance measures. For example, managers can increase financial performance in the short-term by accelerating sales or by providing sales pressure, which might be detrimental to long-term performance. The limited empirical evidence available is consistent with this argument and shows that the use of financial performance measures for incentive purposes leads managers to shorten their time-horizon (Merchant 1990; Van der Stede 2000). Although managerial short-term orientation is not dysfunctional in every circumstance (see e.g., Merchant and Manzoni 1989, p. 552) it is often harmful, and incorporating non-financial performance measures can reduce it. Given the agency theory prediction that managerial effort is determined by the incentives provided, the literature suggests that financial performance measures provide managers with short-term incentives, while

[6] The internal non-financial performance measures are excluded because it is unclear whether or not these measures are leading indicators. For example, the literature suggests that quality initiatives have not led to improved performance (Ittner and Larcker 1995). Furthermore, for the purpose of this dissertation, it is sufficient to restrict the attention to the external non-financial performance measures. Finally, none of the empirical results presented in chapter 6 are affected by the inclusion of the internal non-financial performance measures.

external non-financial performance measures provide managers with long-term incentives, which leads to the following hypotheses.

H5a: The use of financial performance measures for incentive purposes increases managerial short-term orientation.
H5b: The use of external non-financial performance measures for incentive purposes decreases managerial short-term orientation.

A similar line of reasoning applies to the target difficulty associated with the financial and external non-financial performance measures. That is, given the implications of goal theory, more difficult financial (external non-financial) performance targets increase (decrease) managerial short-term orientation. Once again, it is not clear *a priori* if this type of behavior increases or decreases long-term performance. For example, difficult financial performance targets might provide managers with incentives to be more efficient (functional) or to defer expenditures with respect to maintenance (dysfunctional) in order to reach their target. On the other hand, Ittner and Larcker (2000) state that non-financial performance measures are likely to be characterized by diminishing returns at higher performance levels. This means that difficult non-financial performance targets provide managers with incentives to provide 'service', but 'too difficult' targets will lead to decreased performance because the associated costs with this increased 'service' will exceed the benefits. Although the effect of target difficulty on performance is unclear, this does not alter the prediction that a more difficult financial (external non-financial) performance target increases (decreases) managerial short-term orientation. Furthermore, under the assumption that firms make optimal decisions regarding the design of incentive systems, no performance effects are expected. As a result, I state the following hypotheses.

H6a: The difficulty of financial performance targets increases managerial short-term orientation.
H6b: The difficulty of external non-financial performance targets decreases managerial short-term orientation.

All of the studies reviewed in chapter 2 examine performance measures and performance targets in isolation (e.g., Banker et al. 2000; Merchant and Manzoni 1989). However, it is very likely that firms set targets dependent on the degree to which the performance measures are used for incentive purposes. Simons (1988), for example, finds that targets are more difficult when these are also used for incentive purposes in a so-called budget-based compensation scheme. Other findings in the budgetary control literature provide similar

results. For example, Merchant (1985), Dunk (1993), and Van der Stede (2000) all find that an increased emphasis on budgets for evaluation purposes decreases budgetary slack. In general, the empirical results indicate that an increased use of a particular performance measure for incentive purposes increases the difficulty of the target associated with that performance measure. Two explanations can be given for this positive relationship. First, given the rational expectations of superiors, performance targets will be more difficult when linked to rewards in order to offset the incentives given to subordinates to build in slack to maximize their rewards. Second, an increased use of performance measures for incentive purposes increases the likelihood of detecting and curtailing slack (Williamson 1964), which results in more difficult targets. Focusing on the effects of both financial and external non-financial performance measures, the above findings lead to the following hypothesis.

H7: The use of financial (external non-financial) performance measures for incentive purposes increases the difficulty of the financial (external non-financial) performance target.

Finally, making rewards contingent on performance not only provides managers with incentives but also increases the risk they have to bear. Increasing the difficulty of the performance target further increases this risk because it becomes more difficult to earn a 'bonus'. Agency theory states that the use of performance measures for incentive purposes depends on the trade-off between incentives and risk sharing and is affected by the risk aversion of the agent. Although Moers and Peek (2000) show that risk aversion affects the use of performance measures in CEO incentive contracts, it is unlikely that this prediction holds for managers lower in the organization. Most firms design incentive contracts for their 'lower-level' managers based on characteristics of the firm and the individual's job because it is simply too costly to design incentive contracts based on personal characteristics. Since discretion is given to the superior in setting performance targets for individual managers, it might be more efficient to adjust the performance targets for the level of risk aversion. For example, Merchant and Manzoni (1989, p. 550) state that less difficult targets may be the outcome of the trade-off between incentives and risk sharing when performance measures are used for incentive purposes. If superiors indeed set less difficult performance targets to adjust for the risk imposed on the manager, then risk aversion plays a role in setting performance targets. Similarly, Young (1985) finds that risk averse managers build in more budget slack than non-risk averse managers, probably as a response to uncertainty. Although superiors are likely to be aware of this behavior, they might allow 'some' slack in order to reduce the risk imposed on the manager. This implies

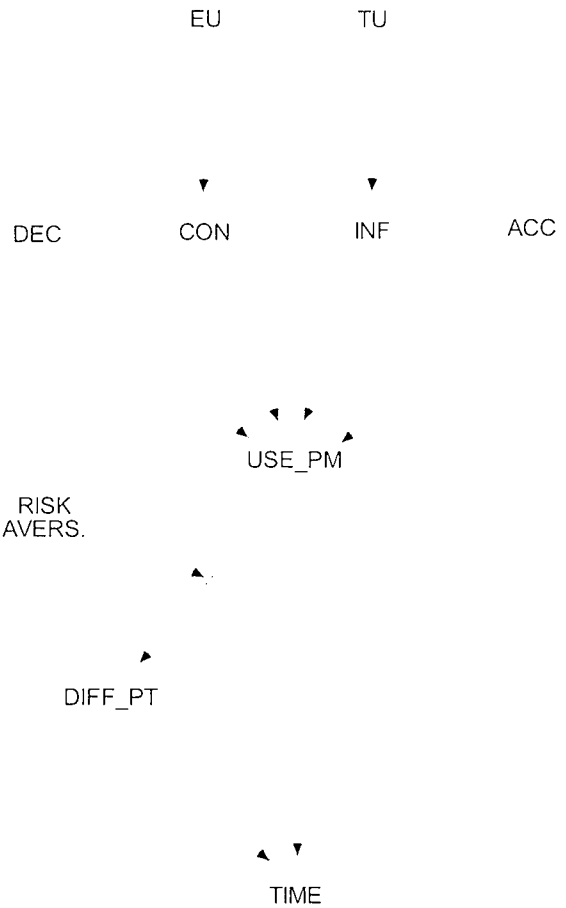
that although the use of performance measures increases the difficulty of performance targets, this effect will be lower the higher the risk aversion of the manager. The above argumentation leads to hypothesis 8.

H8: The effect of the use of financial (external non-financial) performance measures for incentive purposes on the difficulty of the financial (external non-financial) performance target is less positive for higher levels of managerial risk aversion.

4.4 Summary

The hypotheses developed in Part A and B are summarized, in a general sense, in figure 4.1. The next chapter describes the research method used to test these hypotheses, while the empirical results are presented in chapter 6.

Figure 4.1
Overview of relationships subject to empirical testing



Notes:
[a] EU = environmental uncertainty;
TU = task uncertainty;
DEC = decision-making authority;
CON = controllability of performance measures;
INF = informativeness of performance measures;
ACC = measurement accuracy of performance measures;
USE_PM = use of performance measures;
RISK AVERS. = managerial risk aversion;
DIFF_PT = difficulty of performance target;
TIME = managerial short-term orientation.

chapter 5

RESEARCH METHOD

5.1 Introduction

To test the hypotheses developed in the previous chapter, I gathered data from multiple sources. The data sources used consist of interviews, questionnaires and proprietary archival data. Survey data are available for 114 Dutch managers employed in 6 firms, while proprietary data are available for 96 Dutch managers employed in 5 firms. This chapter presents details on the sample selection and data collection.

5.2 Sample

5.2.1 Sample of firms

This dissertation focuses on the use of performance measures in the evaluation and compensation of managers. That is, rather than explaining why firms use incentive systems, this dissertation addresses which performance measures are used given the firm's trade-off to use an incentive system. As a result, eligible firms must have an incentive system in place, which renders random sampling inappropriate. In order to select the firms of interest, I used the following procedure. I contacted Hay Management Consultants (HMC), which is one of the major compensation consultants in the world and as such the market leader in The Netherlands. The majority of the clients of HMC are firms that have implemented or are planning to implement variable compensation

systems. HMC provided a list of clients that were eligible for this study, which contained the name of the firm, name of the Human Resource Manager, firm address, and telephone number.

I called the Human Resource (HR) Managers of fifty firms to explain the research study and solicit their participation. Participation, at first, meant giving an interview. Out of the fifty firms, fifteen (30%) agreed to an interview. Noteworthy is that the majority of the firms (17) that did not agree to participate were firms that were currently implementing a new or 'updated' variable compensation system, which they characterized as 'politically sensitive'. Other reasons for non-participation were time constraints (11), reorganizations (5), and mergers (2).

The interview with the HR managers served two purposes. First, the interview was used to get a better understanding of the performance evaluation and compensation system in place. It was important to examine if performance evaluation and compensation were an issue and to what extent variable compensation was important. This facilitated a more specific selection of firms relevant to this study. Second, the interview was used to ask the HR manager to support the research and to be its 'champion' within the firm.

During the interviews, the content of participation was discussed in more depth. I explained that participation implied (1) the selection of respondents, (2) the distribution of questionnaires by internal mail, (3) the attachment of a letter of endorsement by the HR manager or a higher-level official, (4) administrative support for follow-up procedures, and (5) the provision of a detailed description of the respondent's annual bonus plan. Of the fifteen firms interviewed, six declined further collaboration. The reasons why these firms did not participate were that they did not allow me to go 'into the firm' (4 firms) or that they did not have an annual bonus system (2 firms). Of the nine firms that agreed to participate, three requested a more tailor-made study. To assure uniformity of the research design, I decided to design a separate study for each of these firms and to exclude them from the current study.[1] As a result, the final sample consists of six firms. Descriptive statistics are provided in table 5.1.

5.2.2 Sample of respondents

After the firms agreed to participate in the study, the HR manager of each firm selected the sample of respondents. The selection of respondents by the HR manager instead of the researcher has two benefits. First, the research is designed to assure anonymity. Although anonymity can be assured even if the researcher makes the selection, the respondents might not perceive this to be

[1] The three studies are a (1) field study, (2) archival study, and (3) questionnaire study complemented with archival data. To date these studies are still in progress.

true. This can result in either biased responses or no responses at all. Second, the HR managers are able to make a random selection of respondents that are eligible to participate. This random selection is difficult, if not impossible, to achieve by the researcher because of data restrictions.

In making the selection, the HR managers were given four criteria on which they should base their selection. First, the respondents should have managerial responsibilities, either as head of a functional department or as head of a division, business unit or something similar. To assure a minimum level of managerial responsibilities, the respondent's job design should have a 'score' greater than 400 Hay-points.[2] Second, the respondent should have an annual bonus plan. Third, the respondent should have experienced at least one annual performance evaluation cycle. Finally, to control for cultural differences, the respondents should be native Dutch.

The HR managers were asked to select as many respondents as possible within the above four constraints. The selection by the HR managers resulted in 202 managers that were asked to participate in the study. The number of managers per organization ranged from 10 to 75.

Table 5.1
Descriptive statistics of participating firms

Firm	*Activity*	*Sales (x fl.1000)*	*# of employees*
A	Provision of financial services	Not available	1,690
B	Trade of machinery and provision of technical services	6,109,248	12,207
C	Provision of life and indemnity insurance	2,577,777	1,275
D	Trade of pharmaceutical products	433,128	401
E	Production of food products	6,663,161	7,482
F	Financial leasing	Not available	354

5.3 Questionnaire Design

5.3.1 Translation, pre-test, and final format

The language used in the questionnaire was Dutch. The reason for choosing the Dutch language was first of all that not all managers were familiar enough with the English language to design an English questionnaire. Second, to elicit a response from the managers, the study was presented to the individual

[2] The Hay-points are based on the Hay Guide Chart Profile Method, a system that compares the value of jobs based on multiple factors such as accountability and know-how (Flannery et al. 1996, p. 20). A score greater than 400 relates to higher-level personnel.

managers as a 'Dutch study'. The choice of the Dutch language meant that some of the measurement instruments that have previously been used in Anglo-Saxon research had to be translated. Hartmann (1997) uses some of these measurement instruments in a Dutch study. For the translation procedure for these variables, I refer to his study.[3] For the remaining variables, I used the following procedure to assure a correct translation. First of all, I translated the remaining Anglo-Saxon instruments into Dutch and designed the first draft of the questionnaire. This draft was presented to one of my supervisors who possesses fluency in Dutch and English and is very familiar with the area of research. He judged the translated instruments and provided a back translation for questions that were not stated in a clear way. This back translation was compared to the original instruments and minor adjustments were made.

After finalizing the translation of some of the Anglo-Saxon measurement instruments, a second full draft was designed and presented to seven Dutch accounting colleagues. All seven colleagues were asked to comment on the draft with respect to layout, wording, understandability, and content validity of the instruments developed for this study. This resulted in a minor revision of the layout and wording and a third draft was prepared. As a final test, this third draft was pre-tested with all six HR managers of the participating firms. All six HR managers were theoretically eligible to fill in the questionnaire and therefore representative of the sample. The HR managers were asked to comment on the content, layout, and understandability of the questionnaire. In a follow-up telephone call, I discussed the questionnaire with the HR managers and explained the constructs. This pre-test led to only minor changes in wording. Finally, I asked the estimated time to complete the questionnaire. All six HR managers agreed that it was possible to fill out the questionnaire in approximately 30 minutes.

After all the necessary adjustments were made, the final version of the questionnaire was designed and printed. To maximize the response rate, I designed the final questionnaire according to the guidelines of Dillman's (1978) *Total Design Method*.[4] The guidelines of the Total Design Method had implications for the format and layout of the questionnaire and the complete package that was send to the respondents. Attached to each questionnaire was a cover letter printed on university stationary with a handwritten signature. The cover letter explained the research project and requested the participation of the respondent. It further guaranteed anonymity of the responses and that no individual responses would be disclosed to any third party, which included

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[3] The translated variables taken from Hartmann (1997) are environmental uncertainty, task uncertainty, and target difficulty.

[4] The procedure used in this dissertation is similar to that used by Hartmann (1997).

members within their own organization. The letter ended with thanking the respondents in advance for their participation in this study.

The final questionnaire was a twenty-page booklet in A4 format digitally printed on high quality paper. The cover page of the booklet contained the name of the research project *'Beoordelen en Belonen'* (in English: Performance Evaluation and Compensation) and the name of the university. The first two pages of the questionnaire explained the purpose of the study, provided instructions for filling out the questionnaire, and stated that filling out would take approximately 30 minutes. It further contained my full name, address, email, and telephone number. The final page of the questionnaire was a blank page that could be used by the respondents to express their opinion about the questionnaire.

Finally, the package contained a self-addressed prepaid answering envelope and a self-addressed pre-stamped postcard. The postcard gave the respondents the opportunity to indicate that they filled out the questionnaire and wished to receive a summary of the research results.

5.3.2 Distribution and follow-up

The complete package containing the cover letter, questionnaire, envelope, and postcard was delivered in person to the HR managers of all participating firms. Each package contained a unique code for each respondent, which was also printed on the final page of the questionnaire. The HR managers were given a codebook, which contained the codes of the questionnaires delivered. The HR managers were asked to write down the name and internal address of each respondent on the envelope and behind the corresponding code in the codebook. This coding procedure served two purposes. First, it allowed the questionnaires to be traced without violating the anonymity of the respondents. Second, any archival data that were individual-specific could be linked with the questionnaire data by using the codes instead of the names of the respondents, which would once again not violate the anonymity principle. The HR managers were finally asked to attach their letter of endorsement to each package and send the packages to the respondents by internal mail.

I contacted the HR managers by telephone to ask if and when they had send the packages to the respondents. A package of follow-up postcards was given to each HR manager approximately two weeks after the distribution of the questionnaire. The postcard thanked those who filled out the questionnaire and requested once again the participation of those who did not. All postcards contained a handwritten signature. As with the questionnaires, the postcards were send by the HR managers to the respondents by internal mail. I checked the mailing of the postcard by a follow-up telephone call to make sure that all cards were sent.

5.3.3 Response rate

Of the 202 questionnaires that were distributed, 114 were returned directly to me. This corresponds to an overall response rate of 56%. This response rate is satisfactory and comparable to the response rates reported in previous accounting studies. The response rates for the individual firms ranged from 33 – 100%. More details on the response rates are provided in table 5.2.

Of the 114 questionnaires returned, nine have missing data. Because the presence of missing data can be an indication of inappropriateness of the questionnaire for the respondent in question, I delete the nine questionnaires with missing data listwise (Oppenheim 1992). The number of usable questionnaires is therefore 105.

Table 5.2
Sample, respondents, and response rate per firm

Firm	*Sample*	*N*	*Response rate*
A	10	10	100%
B	49	31	63%
C	25	14	56%
D	75	36	48%
E	15	5	33%
F	28	18	64%
Total	202	114	56%

5.4 Proprietary Archival Data

Five firms provided archival data with respect to the annual bonus contract of the respondents, which were used to validate the survey-based measures of performance measure use. Four firms have uniform contracts for their managers with respect to the relative use of financial versus non-financial performance measures, although the number of performance measures in each category can vary between managers.[5] However, I have no data with respect to the number of performance measures for each of the respondents in these four

[5] Increasing the number of performance measures can dilute incentives. Assume the following: 50% of the bonus of both manager *X* and manager *Y* depends on financial performance, while 50% depends on non-financial performance. Further assume that manager *X* is evaluated based on *one* financial performance measure and *one* non-financial performance measure, while manager *Y* is evaluated based on *one* financial performance measure and *five* non-financial performance measures. Although the *explicit* relative use of financial performance measures is identical between both managers, the *implicit* relative use of financial performance measures will be higher for manager *Y*.

firms. One firm has manager-specific contracts, which were provided to me.[6] As a result, archival data are available for 96 managers in five firms (firm A-E). After listwise deletion of the nine questionnaires with missing data, survey and proprietary data are available for 87 managers.

5.5 Measurement Instruments

5.5.1 Introductory remark

The measurement instruments used in the questionnaire are taken either from previous accounting studies or are newly developed. More specifically, the instruments used to measure task uncertainty, environmental uncertainty, decision-making authority, performance target difficulty, risk aversion, and short-term orientation are taken from previous accounting studies, while the instruments used to measure the performance measure characteristics and performance measure use are newly developed.[7] All instruments, except for the performance measure characteristics, are described in appendix B.[8]

Since the data are obtained through questionnaires, all measures are perceptual measures. That is, each measure reflects the individual respondent's perception of the variable in question. As a result, the responses are individual-specific, not firm-specific. Although, I do not specifically label each variable, for example, *perceived* task uncertainty or *perceived* environmental uncertainty, it should be kept in mind that all variables are in fact perceptions.

5.5.2 Task uncertainty

The instrument to measure task uncertainty is taken from Hartmann (1997). This instrument, developed by Withey et al. (1983), contains nine statements with respect to the analyzability (complexity) and variability (diversity) of the respondent's tasks. A five-point fully anchored scale is used to indicate the level of agreement with each of these nine statements. Confirmatory factor analysis indicates that all nine items load significantly on the latent variable, although three items have relatively low factor loadings. A principal component analysis with oblique rotation reveals an indication of multi-

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[6] The archival data can be linked to the questionnaire data through codes. Each questionnaire contains a unique code that is printed on the final page of the questionnaire. The HR manager of each firm provides the archival data mentioning the codes instead of the respondent's name, which does not violate the anonymity principle.

[7] I use confirmatory factor analysis for the measures used in previous research and principal component analysis ('exploratory factor analysis') for the newly developed measures.

[8] The instrument used to measure the performance measure characteristics is described in section 5.5.5.

dimensionality. However, the factors identified do not correspond to the dimensions of analyzability and variability that are sometimes seen as important *independent* factors (see e.g., Brownell and Hirst 1986). Since the principal component analysis does not reveal clear independent factors and all items load significantly on the latent variable, I compute task uncertainty by summing and averaging the standardized scores of the nine items.[9]

5.5.3 Environmental uncertainty

I construct the environmental uncertainty variable by taking the instrument used by Hartmann (1997). This instrument is derived from the scales used by Govindarajan (1984) and Merchant (1990) and consists of five attributes with respect to the respondent's work environment. The five attributes relate to the behavior of (1) customers, (2) competitors, and (3) suppliers, as well as (4) technological developments and (5) political and/or legal changes. Ten items are used to indicate to what extent each of these five attributes are *predictable* and have an *impact* on the work and performance of the respondents. A six-point fully anchored scale is used, which consists of a five-point scale to indicate the extent of predictability and impact and an additional option that can be used to indicate that the specific factor is not part of the respondent's environment.

Similar to the way in which Khandwalla (1972) and Libby and Waterhouse (1996) measure competition, I compute the environmental uncertainty variable by multiplying, for each attribute, the ratings on impact by predictability and taking the square root of the product.[10] Confirmatory factor analysis indicates that all but one product term load significantly on the latent variable. The attribute *'political and/or legal changes'* does not load on the above construct and is therefore deleted from the measurement instrument. As a result, I measure environmental uncertainty by summing and averaging the standardized scores of the remaining four attributes.

5.5.4 Decision-making authority

I measure decision-making authority by taking the scale used by Gordon and Narayanan (1984). The instruments asks the respondents to indicate the extent to which they have decision-making authority with respect to (1) development of new products and services, (2) hiring and firing of personnel, (3)

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[9] In computing all constructs with multiple items, I use unit-weighted average standardized scores because these have preferred psychometric properties relative to regression estimates of factor scores (Grice and Harris 1998).

[10] The scores for impact and predictability are such that higher scores for impact mean higher impact, while higher scores for predictability mean lower predictability. The logic underlying the multiplication is that given the impact of the attributes, increased unpredictability makes it more difficult to control for this impact, which increases uncertainty.

selection of large investments, (4) budget allocations, and (5) pricing decisions. A five-point fully anchored scale is used to indicate the level of authority. Confirmatory factor analysis shows that all five items load significantly on the latent variable decision-making authority. I compute the decision-making authority construct by summing and averaging the standardized scores of the five items.

5.5.5 Performance measure characteristics

To date no attempt has been made to measure the characteristics of performance measures. In order to measure the performance measure characteristics, I therefore develop new constructs. The survey questionnaire contains, for each type of performance measure, 15 statements concerning the performance measure characteristics. A five-point fully anchored scale is used to indicate the level of agreement with these statements. The 15 statements are based on the literature with respect to the controllability principle (e.g., Merchant 1989) and the principal-agent model. The statements relate to the extent to which each type of performance measure is influenced by (1) the manager's actions and (2) factors outside the control of the manager, as well as the extent to which the measure is objective and verifiable and they are designed to measure the constructs informativeness, controllability, and measurement accuracy. Table 5.3 lists all 15 items. *A priori* it is expected that items *a.-e.* will measure controllability, *f.-k.* informativeness, and *l.-o.* measurement accuracy.

Principal component analysis with oblique rotation reveals four factors with eigenvalues greater than 1, explaining 59% of the total variance. Table 5.3 shows how each of the 15 items load on the four factors. The results indicate that there are three 'independent' constructs, i.e., factor 1-3, while factor 4 seems to be a mixture of factor 1 and 3. Examining the items loading on factors 1-3 reveals that the items loading on factor 1 relate to the impact the manager has on performance, while the items loading on factor 2 and 3 relate to respectively the objectivity and verifiability of the measure and the impact of uncontrollable factors. In general, the principal component analysis seems to be consistent with the expectation that the 15 items contain the constructs informativeness (factor 1), controllability (factor 3), and measurement accuracy (factor 2). The only item that does not load on one of the first three factors is item *g*.

I measure the constructs informativeness, controllability, and measurement accuracy by summing and averaging, for each type of performance measure separately, the standardized scores of the items that relate to respectively factor 1, factor 3, and factor 2.

Table 5.3

Principal component analysis with oblique rotation of the 15 items related to the performance measure characteristics (1) informativeness, (2) controllability, and (3) measurement accuracy based on 315 (3x105) observations (only factor scores higher than 0.3 are shown)

Items	*Factor 1*	*Factor 2*	*Factor 3*	*Factor 4*
My performance expressed in xxx performance measures is strongly affected by				
a. ...changes in economic conditions			0.698	
b. ...decisions made in other parts of the organization			0.394	
c. ...changes in the behavior of customers			0.757	
d. ...changes in the behavior or strategies of suppliers			0.622	-0.349
e. ...changes in the behavior or strategies of competitors			0.726	
f. Whether I function well or not as a manager can be expressed accurately in xxx performance	0.427			-0.578
g. Many of the activities and tasks that I perform do not show up in xxx performance				0.791
h. If I perform well as a manager, it is directly reflected in better xxx performance	0.505			-0.734
i. Working hard leads to better xxx performance	0.837			
j. Devotion and effort in my job leads to better xxx performance	0.782			
k. Providing effort in my job leads to better xxx performance	0.851			
l. The measurement of xxx performance is objective and verifiable		0.837		
m. The measurement of xxx performance is done by objective persons		0.871		
n. An independent person verifies the measurement of xxx performance		0.837		
o. The measurement of xxx is predominantly of a quantitative nature		0.562		
Eigenvalue	3.42	2.34	2.05	1.09

5.5.6 Performance measure use

The extent to which each type of performance measure is used for incentive purposes is measured using eight items. These items relate to the use of the performance measures for (1) evaluation purposes, (2) monetary compensation, and (3) non-monetary rewards. A five-point fully anchored scale is used to indicate the importance of each type of performance measure for performance evaluation and compensation purposes. Principal component analysis reveals one factor with an eigenvalue greater than 1, explaining 58% of the total variance. I compute the construct performance measure use by summing and averaging the standardized scores of the eight items for each type of performance measure.

To test whether these survey-based constructs of performance measure use are consistent with the relative reliance on financial performance measures (%FPM) stated in the annual bonus contract, I split the sample into two groups of approximately equal size based on the median reported %FPM. For each sub-sample, I compare the use of financial performance measures with the use of the two non-financial performance measures using a paired-sample t-test.

Table 5.4
Paired sample t-test with respect to differences between the use of financial and non-financial performance measures (n=87)

	Relative reliance on financial performance measures in annual bonus contract			
	Low		*High*	
Performance measure	*Mean use*	*Difference*	*Mean use*	*Difference*
Financial	-0.375		0.388	
		-0.463***		0.688***
Internal non-financial	0.088		-0.300	
Financial	-0.375		0.388	
		-0.331***		0.565***
External non-financial	-0.044		-0.177	
Internal non-financial	0.088		-0.300	
		0.132		-0.123
External non-financial	-0.044		-0.177	

Notes:
***, **, *, † is significant at respectively the 1%, 2½%, 5%, and 10% level (one-tailed).

The results, shown in table 5.4, indicate that for the 'low-%FPM' sub-sample the use of financial performance measures is indeed significantly lower than the use of the non-financial performance measures (one-tail $p<0.01$). For the 'high-%FPM' sub-sample the use of financial performance measures is

significantly higher than the use of the non-financial performance measures (one-tail $p<0.01$). Further, for both sub-samples there is no significant difference between the use of the two non-financial performance measures. These results provide some evidence that the survey-based measures are consistent with the weights stated in the annual bonus contract.

In section 5.4, I stated that four firms have uniform annual bonus contracts with respect to the relative use of financial versus non-financial performance measures, although the number of performance measures in each category can vary between managers. To test whether respondents within each firm report firm-specific incentives, i.e., corporate policy, rather than manager-specific incentives, I examine the distribution of responses for each of these four firms. The results show that, although the mean response is consistent with corporate policy, there is no clustering of responses and there is significant variation in responses within each firm. These results suggest that the firms in question create manager-specific incentives and that the respondents report these manager-specific incentives.

5.5.7 Performance target difficulty

The instrument to measure the construct performance target difficulty is based on Kenis (1979) and contains five items. A five-point fully anchored scale is used to indicate, for each type of performance measure, the extent to which the performance targets are difficult to achieve and require a high amount of effort. Confirmatory factor analysis shows that all five items load significantly on the latent variable. I compute the construct performance target difficulty by summing and averaging the standardized scores of the five items for each type of performance measure. In a related study, I find that the correlation between this survey-based measure and archival data on the actual achievement of targets is significantly negative (one-tail $p<0.05$), which indicates that the instrument measures what it is supposed to measure.

5.5.8 Managerial risk aversion

Comparable to Young (1985), I measure risk aversion by giving the respondent the option to choose between two alternative compensation contracts: (1) a fixed salary of 100,000 or (2) a fixed salary of 80,000 with a probability of receiving a bonus of 40,000. I ask the respondents to indicate how large the probability of receiving the bonus should be before they prefer alternative two to alternative one. The probability reflects the manager's risk aversion, where a higher probability means higher managerial risk aversion.

Table 5.5
Descriptive statistics of variables used (n=105)

Variable	*Mean*	*Standard deviation*	*Actual range*	*Cronbach alpha*
Task uncertainty	0	0.60	-1.22 – 1.54	0.77
Environmental uncertainty	0	0.68	-3.32 – 1.48	0.59
Decision-making authority	0	0.71	-1.82 – 1.49	0.75
Informativeness FPM	0	0.70	-1.73 – 1.83	0.73
Controllability FPM	0	0.61	-1.41 – 1.64	0.57
Measurement accuracy FPM	0	0.76	-1.98 – 1.34	0.75
Informativeness INFPM	0	0.76	-2.14 – 1.68	0.81
Controllability INFPM	0	0.67	-1.43 – 1.98	0.70
Measurement accuracy INFPM	0	0.77	-1.75 – 2.05	0.77
Informativeness ENFPM	0	0.78	-2.39 – 1.57	0.83
Controllability ENFPM	0	0.65	-1.56 – 1.91	0.65
Measurement accuracy ENFPM	0	0.77	-1.79 – 1.44	0.78
Use of FPM	0	0.74	-2.11 – 1.59	0.88
Use of INFPM	0	0.78	-2.31 – 1.56	0.91
Use of ENFPM	0	0.77	-2.32 – 1.49	0.90
Difficulty of FPT	0	0.74	-1.85 – 1.29	0.79
Difficulty of INFPT	0	0.72	-1.82 – 1.47	0.76
Difficulty of ENFPT	0	0.69	-2.21 – 1.36	0.73
Managerial risk aversion	66.30	15.13	30 – 100	-
Short-term orientation	68.92	24.55	3 – 100	-

Notes:
[a] FPM: financial performance measures
INFPM: internal non-financial performance measures
ENFPM: external non-financial performance measures
FPT: financial performance target
INFPT: internal non-financial performance target
ENFPT: external non-financial performance target

5.5.9 Managerial short-term orientation

The degree to which managers are short-term oriented is measured with the time-orientation instrument used by Merchant (1990) and more recently by Van der Stede (2000). The instrument asks respondents to indicate the percentage of their time that is devoted to activities of which the outcome will show up in the financial results within (1) one month or less, (2) one month to one quarter, (3) one quarter to one year, and (4) one year to five years. Managerial short-term orientation is computed by summing the percentages of the first three categories, i.e., effects within one year.

Descriptive statistics for all variables are presented in table 5.5.

5.6 Test for Non-response Bias

Because the response rate is not 100%, though satisfactory, I conduct a test for non-response bias. In general, two possibilities exist for testing for non-response bias. The first possibility is to obtain additional information about non-respondents. The benefit of this procedure is that you are actually examining non-respondents. There exist, however, two problems with this procedure. First, there is no theory available that states what type of information is relevant for testing for non-response bias. This means that the choice of the additional information is purely ad-hoc. Second, gathering the additional information is time-consuming and might break the promise of anonymity (Brownell 1995).

A second possibility is to compare the means of each of the variables of interest to the study for early and late respondents. The assumption underlying this test is that non-respondents are likely to be more similar to late respondents than to early respondents (Brownell 1995). If no significant differences are found between early and late respondents with respect to the variables of interest, then this suggests that there is no bias from non-response. The problem with this test is obviously the extent to which the above assumption actually holds. However, the benefit of using this test is that the variables of interest are compared instead of variables that are chosen on an ad hoc basis. For these reasons, I use the second option to test for non-response bias.

I split the sample at the firm-specific median response time and calculate a t-test for differences in means for each of the variables of interest to this study. The results, shown in table 5.6, indicate that there are no significant differences between early and late respondents for any of the variables, which suggests the absence of non-response bias.

Table 5.6
Analysis of bias from non-response

Variables	*Mean score*		*t-value*	*p-value*
	Early responders	*Late responders*		
Task uncertainty	0.012	-0.092	0.826	0.411
Environmental uncertainty	0.005	0.035	-0.232	0.817
Decision-making authority	0.104	-0.023	0.850	0.397
Informativeness FPM	-0.000	-0.083	0.550	0.584
Controllability FPM	0.032	-0.015	0.368	0.714
Measurement accuracy FPM	0.011	-0.027	0.224	0.823
Informativeness INFPM	0.036	-0.209	1.531	0.129
Controllability INFPM	0.028	-0.047	0.538	0.592
Measurement accuracy INFPM	0.030	-0.123	0.888	0.377
Informativeness ENFPM	-0.068	-0.151	0.493	0.623
Controllability ENFPM	-0.049	0.048	-0.668	0.506
Measurement accuracy ENFPM	0.018	-0.090	0.619	0.538
Use of FPM	0.056	-0.031	0.567	0.572
Use of INFPM	-0.058	-0.071	0.081	0.936
Use of ENFPM	-0.006	-0.114	0.636	0.526
Difficulty of FPT	0.030	-0.017	0.296	0.768
Difficulty of INFPT	-0.075	-0.030	-0.287	0.775
Difficulty of ENFPT	-0.056	-0.031	-0.168	0.867
Managerial risk aversion	65.90	65.97	-0.021	0.984
Short-term orientation	70.12	69.62	0.095	0.924

chapter 6

THE USE AND EFFECTS OF PERFORMANCE MEASURES AND PERFORMANCE TARGETS: EMPIRICAL RESULTS

6.1 Introduction

In this chapter, I test the hypotheses developed in chapter 4 using the data described in chapter 5. The empirical analysis is split into two parts consistent with the way in which I developed the hypotheses in chapter 4. In section 6.2, I report the empirical results of Part A, which relate to the use of performance measures. In section 6.3, I report the empirical results of Part B, which relate to the effects of performance measures and performance targets.

Part A

6.2 The Use of Performance Measures

6.2.1 Hypotheses

The hypotheses that are tested in Part A are hypotheses 1 through 4. For completeness, I restate these hypotheses below.

H1a: decision-making authority (i.e., the resulting information asymmetry) increases the use of financial performance measures.

H1b: decision-making authority (i.e., the resulting information asymmetry) is not related to the use of internal non-financial performance measures.

H1c: decision-making authority (i.e., the resulting information asymmetry) is not related to the use of external non-financial performance measures.

H2a: the use of financial performance measures increases with their (i) informativeness, (ii) controllability, and (iii) measurement accuracy.
H2b: the use of internal non-financial performance measures increases with their (i) informativeness, (ii) controllability, and (iii) measurement accuracy.
H2c: the use of external non-financial performance measures increases with their (i) informativeness, (ii) controllability, and (iii) measurement accuracy.

H3a: task uncertainty increases the informativeness of financial performance measures.
H3b: task uncertainty increases the informativeness of internal non-financial performance measures.
H3c: task uncertainty is not related to the informativeness of external non-financial performance measures.

H4a: environmental uncertainty decreases the controllability of financial performance measures.
H4b: environmental uncertainty decreases the controllability of internal non-financial performance measures.
H4c: environmental uncertainty decreases the controllability of external non-financial performance measures.

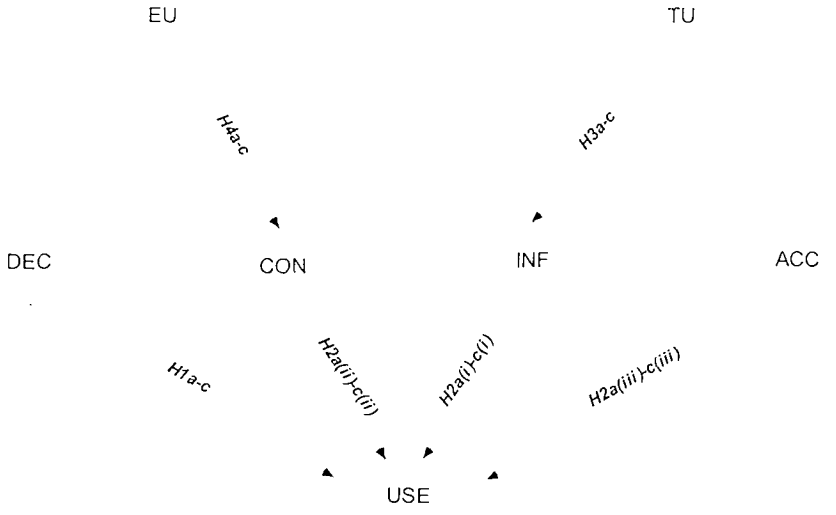
6.2.2 Empirical results

The hypotheses stated in the previous section are tested by estimating the empirical model presented in figure 6.1 using *Amos 4.0*.[1] Because of sample size limitations, I estimate the empirical model for each type of performance measure separately. Furthermore, I treat all variables in the model as observed variables rather than latent variables. The significance levels reported in this chapter are based on bootstrapping (Noreen 1989; Mooney and Duval 1993). I use bootstrapping to avoid the potential problem of non-normality of the data, which renders significance tests invalid. In contrast to 'regular' standard errors, the approximate standard errors generated by bootstrapping do not rely on the

[1] Amos is short for Analysis of Moment Structures. Amos uses the general approach to data analysis known as *structural equation modeling* (Arbuckle and Wothke 1999).

assumptions of multivariate normality or whether the correct model is employed, which leads to more robust results. The applied bootstrapping method replicates the original model a given number of times (in this case 500) using random samples of the original data (with replacement). The sample size of all random samples is equal to the original sample size, i.e., n=105.

Figure 6.1
Empirical model



Notes:
[a] EU = environmental uncertainty;
TU = task uncertainty;
DEC = decision-making authority;
CON= controllability of performance measures;
INF = informativeness of performance measures;
ACC = measurement accuracy of performance measures;
USE = use of performance measures.

For presentation purposes, I discuss the empirical results by hypothesis. However, for a discussion of the empirical results by structural equation model see appendix C. The empirical results with respect to the factors explaining the use of performance measures, i.e., hypotheses 1-2, are presented in table 6.1.

Hypotheses 1a-1c

Hypothesis 1a predicts that decision-making authority has a positive effect on the use of financial performance measures. The empirical results, shown in

table 6.1, indicate that decision-making authority is positively related to the use of financial performance measures (one-tail $p<0.05$), which provides support for hypothesis 1a. The effect of decision-making authority on the use of internal and external non-financial performance measures is unknown *a priori*, as reflected by the null-hypotheses 1b and 1c. The empirical results show that decision-making authority does not affect the use of either internal or external non-financial performance measures. Therefore, hypotheses 1b and 1c are supported.

Table 6.1
Empirical results of the effects of decision-making authority, informativeness, controllability, and measurement accuracy on the use of performance measures

	Dependent Variable		
Independent Variable	*Use of Financial Performance Measures*	*Use of Internal Non-financial Performance Measures*	*Use of External Non-financial Performance Measures*
Decision-making Authority	0.16*	-0.09	-0.08
Informativeness[a]	0.30***	0.48***	0.46***
Controllability[a]	-0.32***	-0.09	-0.09
Measurement Accuracy[a]	0.16*	0.15*	-0.07
Squared Multiple Correlation	0.23	0.27	0.24

Notes:
***, **, *, † is significant at respectively the 1%, 2½%, 5%, and 10% level (one-tailed) using coefficient estimates and standard errors generated from 500 random bootstrap samples (with replacement).
[a] The performance measure characteristics relate to each type of performance measure.
[b] Parameters are maximum likelihood estimates.

Hypotheses 2a(i)-2c(i)

The performance measure characteristic informativeness is hypothesized to have a positive effect on the use of the three types of performance measures, as predicted by the informativeness principle. The empirical results show that informativeness is positively related to the use of all three types of performance measures (one-tail $p<0.01$) and therefore provide strong support for hypotheses 2a*(i)*, 2b*(i)*, and 2c*(i)*.

Hypotheses 2a(ii)-2c(ii)

Hypotheses 2a*(ii)*-2c*(ii)* state that the use of performance measures increases with its controllability, as predicted by the controllability principle. Table 6.1, however, indicates that these hypotheses are not supported by the

data. The empirical results show that controllability is not related to the use of internal and external non-financial performance measures, while it is negatively related to the use of financial performance measures. This last finding is actually contrary to my expectations and I discuss some plausible explanations in the final chapter.

Hypotheses 2a(iii)-2c(iii)

The last performance measure characteristic that is expected to positively affect the use of the three types of performance measures is measurement accuracy. The empirical results show that measurement accuracy is positively related to the use of financial and internal non-financial performance measures (one-tail $p<0.05$) but not related to the use of external non-financial performance measures. As a result, hypotheses 2a*(iii)* and 2b*(iii)* are supported, while hypothesis 2c*(iii)* is not supported by the data.

Hypotheses 3a-3c

The empirical results with respect to the effect of task uncertainty on the informativeness of the three types of performance measures are summarized in table 6.2. The results provide strong support for hypotheses 3a-3c. That is, task uncertainty increases the informativeness of financial performance measures (one-tail $p<0.025$) and internal non-financial performance measures (one-tail $p<0.01$) but it does not affect the informativeness of external non-financial performance measures. Therefore, financial and internal non-financial performance measures become more useful as task uncertainty increases.

Table 6.2
Empirical results of the effect of task uncertainty on the informativeness of performance measures

	Dependent Variable		
Independent Variable	*Informativeness of Financial Performance Measures*	*Informativeness of Internal Non-financial Performance Measures*	*Informativeness of External Non-financial Performance Measures*
Task Uncertainty	0.24**	0.37***	-0.10
Squared Multiple Correlation	0.04	0.08	0.01

Notes:
***, **, *, † is significant at respectively the 1%, 2½%, 5%, and 10% level (one-tailed) using coefficient estimates and standard errors generated from 500 random bootstrap samples (with replacement).
[a] Parameters are maximum likelihood estimates.

Hypotheses 4a-4c

Finally, hypotheses 4a-4c predict that the level of environmental uncertainty negatively affects the controllability of the three types of performance measures. The empirical results, presented in table 6.3, provide strong support for these hypotheses. The analysis shows that environmental uncertainty is negatively related to the controllability of all three types of performance measures (one-tail $p<0.01$). That is, the controllability decreases as environmental uncertainty increases.

Table 6.3

Empirical results of the effect of environmental uncertainty on the controllability of performance measures

	Dependent Variable		
Independent Variable	*Controllability of Financial Performance Measures*	*Controllability of Internal Non-financial Performance Measures*	*Controllability of External Non-financial Performance Measures*
Environmental Uncertainty	-0.38***	-0.28***	-0.23***
Squared Multiple Correlation	0.18	0.08	0.06

Notes:

***, **, *, † is significant at respectively the 1%, 2½%, 5%, and 10% level (one-tailed) using coefficient estimates and standard errors generated from 500 random bootstrap samples (with replacement).

[a] Parameters are maximum likelihood estimates.

In sum, the empirical results first indicate that decision-making authority is positively related to the use of financial performance measures but not related to the use of the non-financial performance measures. Therefore hypotheses 1a-1c are supported. Second, informativeness and measurement accuracy are the most important performance measure characteristics, with informativeness being related to the use of all three types of performance measures and measurement accuracy being related to the use of financial and internal non-financial performance measures. The performance measure characteristic controllability, on the other hand, does not have the proposed positive effect on performance measure use. The only relationship that is significant shows an opposite effect, indicating that the use of financial performance measures is negatively related to their controllability. As a result, hypotheses $2a_i$, $2a_{iii}$, $2b_i$, $2b_{iii}$, and $2c_i$ are supported and hypotheses $2a_{ii}$, $2b_{ii}$, $2c_{ii}$, and $2c_{iii}$ are not supported. Third, the results also provide evidence that task uncertainty increases the informativeness of financial and internal non-financial performance measures, but is not related

to the informativeness of external non-financial performance measures. Therefore, hypotheses 3a-3c are supported, which suggests that the usefulness of financial and internal non-financial performance measures increases with task uncertainty. Finally, the controllability of all three types of performance measures decreases with increased environmental uncertainty, which lends support for hypotheses 4a-4c. That is, the non-financial performance measures contain the same defects as the financial performance measures when environmental uncertainty is high. The results of the hypothesis testing are summarized in table 6.4.

Table 6.4
Results of hypothesis testing

Relationship		*Hypothesis*	*Expected sign*	*Path coefficients*	*Test results*
DEC	→ USE_FPM	H1a	+	0.16*	Supported
DEC	→ USE_INFPM	H1b	?	- 0.09	Supported
DEC	→ USE_ENFPM	H1c	?	- 0.08	Supported
INF_FPM	→ USE_FPM	$H2a_i$	+	0.30***	Supported
CON_FPM	→ USE_FPM	$H2a_{ii}$	+	- 0.32***	Not supported
ACC_FPM	→ USE_FPM	$H2a_{iii}$	+	0.16*	Supported
INF_INFPM	→ USE_INFPM	$H2b_i$	+	0.48***	Supported
CON_INFPM	→ USE_FPM	$H2b_{ii}$	+	- 0.09	Not supported
ACC_INFPM	→ USE_INFPM	$H2b_{iii}$	+	0.15*	Supported
INF_ENFPM	→ USE_ENFPM	$H2c_i$	+	0.46***	Supported
CON_ENFPM	→ USE_ENFPM	$H2c_{ii}$	+	- 0.09	Not supported
ACC_ENFPM	→ USE_ENFPM	$H2c_{iii}$	+	- 0.07	Not supported
TU	→ INF_FPM	H3a	+	0.24**	Supported
TU	→ INF_INFPM	H3b	+	0.37***	Supported
TU	→ INF_ENFPM	H3c	?	- 0.10	Supported
EU	→ CON_FPM	H4a	–	- 0.38***	Supported
EU	→ CON_INFPM	H4b	–	- 0.28***	Supported
EU	→ CON_ENFPM	H4c	–	- 0.23***	Supported

Notes:
***, **, *, † is significant at respectively the 1%, 2½%, 5%, and 10% level (one-tailed) using coefficient estimates and standard errors generated from 500 random bootstrap samples (with replacement).
[a] Parameters are maximum likelihood estimates.

6.2.3 Sensitivity analysis and additional tests

In the empirical analysis, I implicitly tested the prediction that uncertainty has an indirect effect, rather than a direct effect, on the use of performance measures. Simple correlation analysis shows that environmental uncertainty and

the use of financial performance measures are positively related (one-tail $p<0.01$) and that task uncertainty and the use of internal non-financial performance measures are positively related (one-tail $p<0.025$). To examine whether the relationship between the performance measure characteristics and the use of performance measures are due to the omission of the direct effect of uncertainty, I perform two tests.[2] First, I incorporate the direct effects of environmental uncertainty and task uncertainty into the empirical model in figure 6.1 with respect to the two types of performance measures. For both models, the direct effects of both types of uncertainty are not significant, while all other relationships are identical to those presented in the previous section. Second, I test whether the indirect model or the direct model, which is nested in the indirect model, has a better fit to the data. By constraining the relevant relationships to zero, I calculate the chi-square difference statistic between both models for the financial and internal non-financial performance measures. The chi-square difference statistics with respect to financial and internal non-financial performance measures are respectively 32.33 and 43.13 (for all $p<0.01$), which indicates that for both types of performance measures the indirect model has a better fit to the data. As a result, the relationship between the performance measure characteristics and the use of performance measures is not due to the omission of a direct effect of uncertainty.

According to economic theory, organizations should simultaneously select organizational design variables, such as decision-making authority and the use of performance measures (e.g., Milgrom and Roberts 1995; Brickley et al. 1997). To examine whether decision-making authority and the use of performance measures are simultaneously determined, I estimate for each type of performance measure the non-recursive model presented in figure 6.2. To allow the model to be estimated, the model includes, in addition to the hypotheses stated previously and the non-recursive nature, the relationship between environmental uncertainty and decision-making authority. Simple correlation analysis shows that environmental uncertainty and decision-making authority are positively related (one-tail $p<0.05$).[3]

The results related to the use of the non-financial performance measures indicate that decision-making authority has no effect on performance measure use and *vice versa*. The model with respect to the use of financial performance

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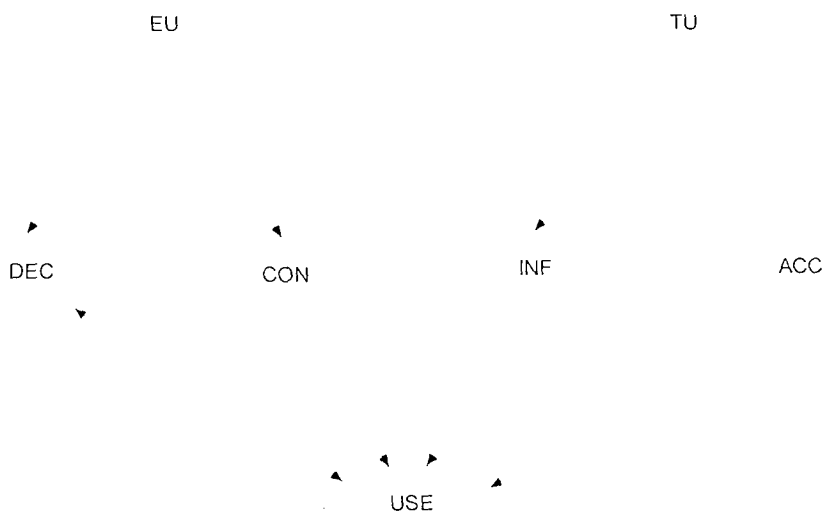
[2] Especially the unexpected significant negative relationship between controllability and the use of financial performance measures might be due to an omitted variable problem. There is evidence that suggests that the use of financial controls increases with uncertainty (e.g., Khandwalla 1972; Simons 1987) and uncertainty might therefore be the omitted variable.

[3] This relationship is to some extent consistent with the predictions made by organization theory, which states that organizations become more decentralized when the environment is more uncertain.

measures is not stable, implying that the empirical model is misspecified. From these results, I conclude that there is no evidence that decision-making authority and the use of performance measures are simultaneously determined, which is consistent with Nagar (1999).

Figure 6.2
Non-recursive model



Notes:
[a] EU = environmental uncertainty;
TU = task uncertainty;
DEC = decision-making authority;
CON= controllability of performance measures;
INF = informativeness of performance measures;
ACC = measurement accuracy of performance measures;
USE = use of performance measures.

Finally, I split the model, presented in figure 6.1, into two parts, i.e., (1) hypotheses 1a-2c and (2) hypotheses 3a-4c, and estimate each part for all three performance measures simultaneously. In testing hypotheses 1a-2c, I allow the performance measures to be simultaneously determined. The results from these additional tests are qualitatively similar to those presented in tables 6.1-6.3.

Part B

6.3 The Effects of Performance Measures and Performance Targets

6.3.1 Hypotheses

The hypotheses that are tested in Part B are hypotheses 5 through 8. For completeness, I restate these hypotheses below.

H5a: The use of financial performance measures for incentive purposes increases managerial short-term orientation.

H5b: The use of external non-financial performance measures for incentive purposes decreases managerial short-term orientation.

H6a: The difficulty of financial performance targets increases managerial short-term orientation.

H6b: The difficulty of external non-financial performance targets decreases managerial short-term orientation.

H7: The use of financial (external non-financial) performance measures for incentive purposes increases the difficulty of the financial (external non-financial) performance target.

H8: The effect of the use of financial (external non-financial) performance measures for incentive purposes on the difficulty of the financial (external non-financial) performance target is less positive for higher levels of managerial risk aversion.

6.3.2 Empirical results[4]

The hypotheses 5 through 7 are tested by estimating the empirical model presented in figure 6.3 using *AMOS 4.0*. Because of sample size limitations, I treat all variables in the model as observed variables rather than latent variables. The empirical results related to the structural equation model are presented in appendix C. Table 6.5 summarizes the results with respect to the effect of the financial and external non-financial performance measures and targets on managerial short-term orientation.

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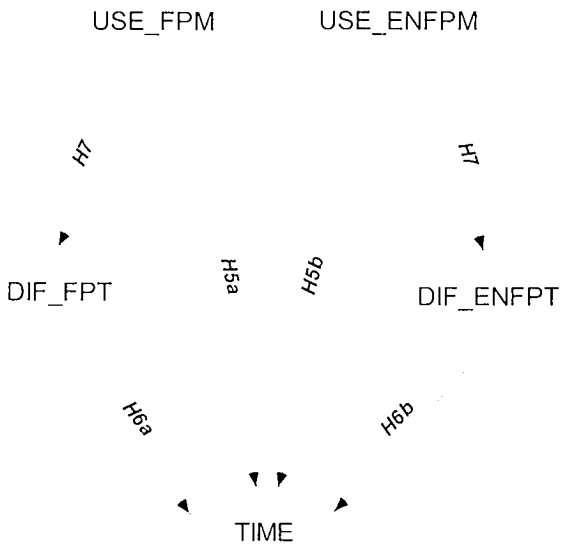
[4] As stated in chapter 4, the non-financial performance measures used in the empirical analysis are the external non-financial performance measures. The results presented in this section are not affected by the inclusion of the internal non-financial performance measures.

Figure 6.3
Empirical model



Notes:
[a] USE_FPM = use of financial performance measures;
USE_ENFPM = use of external non-financial performance measures;
DIF_FPT = difficulty of financial performance target;
DIF_ENFPT = difficulty of external non-financial performance target;
TIME = managerial short-term orientation.

Hypotheses 5a-5b

Hypotheses 5a and 5b predict that the use of financial performance measures increases the manager's short-term orientation, while the use of external non-financial performance measures decreases this type of behavior. The empirical results indicate that the use of both types of performance measures does not affect managerial short-term orientation. Therefore, hypotheses 5a and 5b are not supported by the data, which seems to be inconsistent with previous research.

Hypotheses 6a and 6b

Although the use of performance does not affect managerial short-term orientation, performance targets seem to have a significant impact. Table 6.5 shows that the difficulty of financial performance targets increases managerial short-term orientation (one-tail $p<0.01$), while the difficulty of the external non-financial performance targets decreases managerial short-term orientation (one-

Table 6.6
Empirical results of the effect of the use of performance measures for incentive purposes on the difficulty of performance targets

	Dependent Variable	
Independent Variable	*Difficulty of Financial Performance Targets*	*Difficulty of External Non-financial Performance Targets*
Use of Financial Performance Measures	0.50***	
Use of External Non-financial Performance Measures		0.31***
Squared Multiple Correlation	0.25	0.12

Notes:
***, **, *, † is significant at respectively the 1%, 2½%, 5%, and 10% level (one-tailed) using coefficient estimates and standard errors generated from 500 random bootstrap samples (with replacement).
[a] Parameters are maximum likelihood estimates.

Table 6.7
Empirical results with respect to the effect of managerial risk aversion on the relationship between the use of financial (external non-financial) performance measures for incentive purposes and the difficulty of financial (external non-financial) performance targets

	Low risk aversion	High risk aversion	Difference
USE_FPM → DIF_FPT	0.60***	0.35***	0.25*
USE_ENFPM → DIF_ENFPT	0.38***	0.29***	0.09

Notes:
***, **, *, † is significant at respectively the 1%, 2½%, 5%, and 10% level (one-tailed) using coefficient estimates and standard errors generated from 500 random bootstrap samples (with replacement).
[a] USE_FPM = use of financial performance measures;
USE_ENFPM = use of external non-financial performance measures;
DIF_FPT = difficulty of financial performance target;
DIF_ENFPT = difficulty of external non-financial performance target.
[b] Parameters are maximum likelihood estimates.

The results with respect to the relationship between the use of performance measures and performance target difficulty for high and low risk averse managers are presented in table 6.7. For both groups of managers, the use of financial (external non-financial) performance measures for incentive purposes increases the difficulty of the financial (external non-financial)

performance target (one-tail $p<0.01$). Furthermore, the regression coefficients for the high risk aversion group are lower than those for the low risk aversion group. However, the difference between the regression coefficients is not significant for the external non-financial performance measures and only marginally significant for the financial performance measures (one-tail $p<0.10$). These results provide only weak support for hypothesis 8, which states that managerial risk aversion moderates the relationship between the use of performance measures for incentive purposes and the difficulty of performance targets.

6.3.3 Sensitivity analysis

The finding that the use of financial performance measures and the use of external non-financial performance measures for incentive purposes are not related to managerial short-term orientation seems to be inconsistent with previous evidence (e.g., Merchant 1990). However, previous research neglects the effect of the difficulty of performance targets, which is positively related to the use of performance measures. To test if the results of previous research might be driven by target difficulty, I examine the effect of the use of performance measures on managerial short-term orientation without taking into account the effect of performance targets. The results (not reported) show that the use of financial performance measures is positively related to managerial short-term orientation (one-tail $p<0.05$) and the use of external non-financial performance measures is negatively related to managerial short-term orientation, though not significant. These findings provide some evidence that the results of previous research might be driven by performance target difficulty and that the use of performance measures only indirectly affects managerial short-term orientation.

I tested hypotheses 7 and 8 by analyzing the effect of financial performance measures and external non-financial performance measures separately. However, the predictions stated in hypotheses 7 and 8 are identical for both types of performance measures. A more direct test of the hypotheses is to examine the effect of the use of performance measures *in general* on the difficulty of performance targets. Therefore, I treat each observation with respect to the use of financial (external non-financial) performance measures and financial (external non-financial) performance target difficulty as respectively an observation with respect to the use of performance measures and performance target difficulty. The results of the regression analysis, presented in panel A of table 6.8, indicate that the difficulty of performance targets and the use of performance measures for incentive purposes are positively related (one-tail $p<0.01$), which is consistent with the findings of the original analysis and provides further support for hypothesis 7.

Table 6.8
Empirical results with respect to the relationship between the use of performance measures for incentive purposes and the difficulty of performance targets for the total sample and subgroups of managerial risk aversion

Panel A	Total sample
USE_PM → DIF_PT	0.40***

Panel B	Low risk aversion	High risk aversion	Difference
USE_PM → DIF_PT	0.51***	0.32***	0.19*

Notes:
***, **, *, † is significant at respectively the 1%, 2½%, 5%, and 10% level (one-tailed) using coefficient estimates and standard errors generated from 500 random bootstrap samples (with replacement).
[a] USE_PM = use of performance measures;
DIF_PT = difficulty of performance target.
[b] Parameters are maximum likelihood estimates.

To test hypothesis 8, I repeat the analysis for the low risk aversion group and the high risk aversion group. The results, presented in panel B of table 6.8, show that for both groups of managers, the relationship is positive and significant (one-tail $p<0.01$). Furthermore, the coefficient for the high risk aversion group is significantly lower than the coefficient for the low risk aversion group (one-tail $p<0.05$). These findings provide stronger support for hypothesis 8 than the results from the original analysis and suggest that superiors take the manager's risk aversion into account when setting performance targets.

Finally, in a preliminary analysis, I found that risk aversion and environmental uncertainty are positively correlated (one-tail $p<0.05$). That is, the higher the environmental uncertainty the higher the risk aversion of the manager. The effect of risk aversion on the relationship between the use of performance measures and performance target difficulty might therefore be driven by environmental uncertainty. However, the empirical results (not reported) indicate that environmental uncertainty has no effect on the relationship between performance measures and performance targets.

In sum, the empirical results show that managerial short-term orientation is determined by the difficulty of performance targets. More specifically, difficult financial performance targets increase managerial short-term orientation, while difficult external non-financial performance targets decrease

managerial short-term orientation. The use of either financial or external non-financial performance measures for incentive purposes affects the manager's time horizon only indirectly through its effect on the difficulty of performance targets. Finally, the empirical results provide evidence for the hypothesis that risk aversion moderates the relationship between the use of performance measures and the difficulty of performance targets. The results of the hypothesis testing are summarized in table 6.9.

Table 6.9
Results of hypothesis testing

Relationship		*Hypothesis*	*Expected sign*	*Path coefficients*	*Test results*
USE_FPM	→ TIME	H5a	+	2.30	Not supported
USE_ENFPM	→ TIME	H5b	–	2.81	Not supported
DIF_FPT	→ TIME	H6a	+	13.06***	Supported
DIF_ENFPT	→ TIME	H6b	–	-11.08***	Supported
USE_PM	→ DIF_PT	H7	+	0.40***	Supported
(USE_PM x RISK)	→ DIF_PT	H8	–	-0.19*	Supported

Notes:
*** , ** , * , + is significant at respectively the 1%, 2½%, 5%, and 10% level (one-tailed) using coefficient estimates and standard errors generated from 500 random bootstrap samples (with replacement).
[a] Parameters are maximum likelihood estimates.

chapter 7

SUMMARY AND CONCLUSION

7.1 Introduction

In this final chapter, I summarize the empirical results of this dissertation. Further, I provide conclusions and implications based on the empirical results and discuss some limitations of the study. I end this chapter with directions for future research, which result from the theoretical and empirical analysis presented in previous chapters.

7.2 Summary

The two general research questions that are empirically addressed in this dissertation are:

(1) *What factors explain the use of performance measures?*

(2) *How do performance measures and performance targets, as part of the incentive system, affect behavior?*

More specifically, this dissertation examines the factors that are related to the use of performance measures and the difficulty of performance targets with respect to three different performance dimensions: (1) financial, (2) internal non-financial, and (3) external non-financial. Further, it examines the effect of

the use of performance measures and the difficulty of performance targets on managerial short-term orientation.

The research questions are theoretically analyzed using multiple disciplines that are applied in the incentive literature. The empirical analysis is based on a sample of 105 subordinate managers for which complete survey data are available.

7.2.1 The use of performance measures

The theoretical analysis indicates that the most direct factors affecting the use of performance measures are the level of information asymmetry (need) and the characteristics of performance measures (feasibility). It further indicates that uncertainty affects the use of performance measures indirectly through its effect on performance measure characteristics.

Information asymmetry

The effect of information asymmetry on the use of the three types of performance measures is examined by using decision-making authority as a proxy for information asymmetry. Increased decision-making authority not only increases the information asymmetry between superiors and subordinates with respect to the decisions made by the subordinate managers, but it also increases the range of decisions made. Since it is too costly to have performance measures for each type of action, there exists an increased preference for performance measures that provide (some) information about an increased number of actions. Therefore, decision-making authority does not increase the demand for any performance measures, but it specifically increases the demand for more aggregated performance measures, like financial performance measures.

The empirical results show that decision-making authority is positively related to the use of financial performance measures for incentive purposes. Further, decision-making authority is not related to the use of internal non-financial and external non-financial performance measures. These results, summarized in table 7.1, are consistent with the hypothesis that decision-making authority increases the demand for more aggregated performance measures.

Performance measure characteristics

Based on an analysis of the economics-based and behavioral-based incentive literature, I deduce three general performance measure characteristics: (1) informativeness, (2) controllability, and (3) measurement accuracy. Informativeness reflects the extent to which the manager has an impact on performance. Controllability, on the other hand, reflects the extent to which uncontrollable factors have an impact on performance. Finally, measurement accuracy reflects the degree to which the performance measure measures

performance with error. The feasibility of a specific performance measure increases when it becomes more informative and more controllable and is measured more accurately. Therefore, I predict that the use of a performance measure for incentive purposes increases with its informativeness, controllability, and measurement accuracy.

The empirical results, summarized in table 7.1, indicate that the most influential performance measure characteristic is informativeness. The use of all three types of performance measures is positively related to their informativeness. The second most important performance measure characteristic is measurement accuracy. The empirical results show that the use of financial and internal non-financial performance measures is positively related to the extent that they are measured in an accurate way. However, the use of external non-financial performance measures is unaffected by its measurement accuracy. Finally, controllability does not have the proposed positive effect on performance measure use. The use of internal non-financial and external non-financial performance measures is unaffected by the measures' controllability, while the use of financial performance measures is negatively related to controllability, which is inconsistent with my expectations.

Table 7.1

Summary of empirical relationships between decision-making authority, performance measure characteristics and performance measure use

	Use of ...					
	FPM	Hyp.	*INFPM*	Hyp.	*ENFPM*	Hyp.
Decision-making authority	Positive	1a ✓	n.s.	1b ✓	n.s.	1c ✓
Informativeness	Positive	$2a_i$ ✓	Positive	$2b_i$ ✓	Positive	$2c_i$ ✓
Controllability	Negative	$2a_{ii}$ ✗	n.s.	$2b_{ii}$ ✗	n.s.	$2c_{ii}$ ✗
Accuracy	Positive	$2a_{iii}$ ✓	Positive	$2b_{iii}$ ✓	n.s.	$2c_{iii}$ ✗

Notes:

[a] FPM: financial performance measures
INFPM: internal non-financial performance measures
ENFPM: external non-financial performance measures

[b] n.s.: not significant
✓ : hypothesis supported
✗ : hypothesis not supported

Uncertainty

Uncertainty is one of the most important variables in organizational design frameworks. The contingency literature identifies two types of uncertainty: task uncertainty and environmental uncertainty. Task uncertainty is defined as the uncertainty due to the complexity and diversity of the task

performed, while environmental uncertainty is defined as the uncertainty due to factors in the organization's environment. Uncertainty is, first of all, assumed to affect the feasibility of different performance measures. The general assumption made in previous research is that both task uncertainty and environmental uncertainty negatively affect the usefulness of financial performance measures because uncertainty decreases the controllability of these measures. However, I argue that both types of uncertainty have an effect on different performance measure characteristics. First, in task uncertain situations, task performance is highly affected by the manager's decisions and the ability of the manager to influence performance increases with the amount of feedback received. Therefore, task uncertainty has a positive effect on the informativeness of performance measures that are internal oriented and related to the task and for which feedback can be provided on a frequent basis, i.e., financial and internal non-financial performance measures. Environmental uncertainty, on the other hand, increases the unpredictable impact of uncontrollable factors on performance. Since all three types of performance measures relevant to this dissertation can be affected by uncontrollable factors, environmental uncertainty decreases the controllability of these measures.

Table 7.2
Empirical relationships between uncertainty, informativeness, and controllability

Panel A						
	Informativeness of ...					
	FPM	Hyp.	*INFPM*	Hyp.	*ENFPM*	Hyp.
Task Uncertainty	Positive	3a ✓	Positive	3b ✓	n.s.	3c ✓
Panel B						
	Controllability of ...					
	FPM	Hyp.	*INFPM*	Hyp.	*ENFPM*	Hyp.
Environmental Uncertainty	Negative	4a ✓	Negative	4b ✓	Negative	4c ✓

Notes:
[a] FPM: financial performance measures
INFPM: internal non-financial performance measures
ENFPM: external non-financial performance measures
[b] n.s.: not significant
✓: hypothesis supported
✗: hypothesis not supported

The empirical results regarding the effect of task uncertainty are shown in panel A of table 7.2. The results indicate that, consistent with my expectations,

task uncertainty increases the informativeness of financial and internal non-financial performance measures, but is not related to the informativeness of external non-financial performance measures. Panel B of table 7.2 presents the empirical results with respect to the effect of environmental uncertainty and shows that environmental uncertainty decreases the controllability of all three types of performance measures.

7.2.2 The difficulty of performance targets

Empirical research with respect to factors affecting the difficulty of performance targets is limited. In the current empirical study, I examine the effect of the use of performance measures and the level of managerial risk aversion on the difficulty of performance targets.

Use of performance measures

Previous empirical research in the budgetary control literature finds that the use of budgets for evaluation purposes decreases the amount of budgetary slack and thus the probability of achieving the budget. Applying these results to performance measures and performance targets in incentive systems means that the use of performance measures for incentive purposes increases the difficulty of performance targets. Two explanations are given for this prediction. First, given the rational expectations of superiors, performance targets will be more difficult when linked to rewards in order to offset the incentives given to subordinates to build in slack to maximize their rewards. Second, an increased use of performance measures for incentive purposes increases the likelihood of detecting and curtailing slack, which results in more difficult targets.

The empirical results are summarized in panel A of table 7.3 and show that the use of performance measures for incentive purposes increases the difficulty of performance targets, which is consistent with my expectations.

Risk aversion

Performance-contingent rewards do not only provide managers with incentives, they also provide these managers with risk they have to bear. If the performance targets become more difficult, then the manager bears even more risk because it becomes more difficult to receive the rewards. The difficulty of performance targets is therefore expected to be affected by the trade-off between incentives and risk sharing and more specifically by the risk aversion of the manager. Superiors can either set performance targets taking into account the risk aversion of the manager (top-down) or they can allow risk averse managers to build in 'some' slack (bottom-up). Given that the use of performance measures positively affects the difficulty of performance targets, it is expected

that this positive effect will be lower the higher the risk aversion of the manager as a result of the trade-off between incentives and risk sharing.

Table 7.3
Empirical relationships between the use of performance measures, risk aversion and the difficulty of performance targets

Panel A				
		Difficulty of performance target		Hyp.
	Use of performance measures	Positive		7 ✓
Panel B				
		Difficulty of performance target		Hyp.
Low risk aversion	*Use of performance measures*	Positive		
			High less positive than low	8 ✓
High risk aversion	*Use of performance measures*	Positive		

Notes:
[a] n.s.: not significant
✓ : hypothesis supported
✗ : hypothesis not supported

Panel B of table 7.3 presents the empirical results of the effect of risk aversion and indicates that the positive effect of the use of performance measures on the difficulty of performance targets is lower the higher the manager's risk aversion.

7.2.3 Managerial short-term orientation

The number of firms using non-financial performance measures for incentive purpose is increasing. The primary reason for using non-financial performance measures is that some of them are leading indicators of financial performance and provide managers with long-term incentives. Financial performance measures, on the other hand, are predominantly backward-looking and provide managers with short-term incentives. However, the empirical evidence regarding these claims is limited. Therefore, this dissertation tests the prediction that financial performance measures provide managers with short-term incentives, while external non-financial performance measures, which are assumed to be leading indicators, provide managers with long-term incentives. Furthermore, an analysis of the principal-agent literature and the goal-setting

literature shows that the use of performance measures and the difficulty of performance targets have similar incentive effects. This means that the difficulty of performance targets affects managerial short-term orientation in the same way as the use of performance measures for incentive purposes. More specifically, difficult financial (external non-financial) performance targets increases (decreases) managerial short-term orientation.

Table 7.4
Empirical relationships between performance measures, performance targets and managerial short-term orientation

	Managerial short-term orientation	Hyp.
Use of FPM	n.s.	5a ✗
Use of ENFPM	n.s.	5b ✗
Difficulty of FPT	Positive	6a ✓
Difficulty on ENFPT	Negative	6b ✓

Notes:
[a] FPM: financial performance measures
ENFPM: external non-financial performance measures
FPT: financial performance target
ENFPT: external non-financial performance target
[b] n.s.: not significant
✓: hypothesis supported
✗ : hypothesis not supported

The empirical results, summarized in table 7.4, show that managerial short-term orientation is not affected by the use of either financial or external non-financial performance measures for incentive purposes. The results further show that the difficulty of performance targets does have an effect on managerial short-term orientation. That is, difficult financial performance targets increase short-term orientation, while difficult external non-financial performance targets decrease short-term orientation. As a result, the results suggest that performance measures have an indirect effect on behavior due to their effect on the difficulty of performance targets.

7.3 Conclusions and Implications

The use of multiple disciplines to study the use and effects of performance measures and performance targets in incentive systems has turned out to be a useful exercise. First, the empirical results related to the factors that explain the use of performance measures shed a different light on the behavioral-based RAPM literature. Although I find that environmental uncertainty decreases the

controllability of financial performance measures, as assumed in the RAPM literature, the same result holds for the non-financial performance measures. This indicates that the assumed defects of financial performance measures also apply to the non-financial performance measures. Interestingly, the degree of controllability is actually negatively related to the use of financial performance measures for incentive purposes. A plausible explanation for this relationship might be that superiors want their managers to be aware of the uncontrollables so that they take these into account when making decisions. The finding that controllability is not related to the use of the non-financial performance measures suggests that the creation of 'awareness' is especially relevant if the uncontrollables affect the financial results. As a result, the usefulness of financial performance measures might actually increase with environmental uncertainty because it creates this awareness.

The degree to which the performance measures are measured in an accurate way is positively related to the use of performance measures for incentive purposes. The empirical results indicate that 'noise' due to the measurement process is more important for using performance measures than 'noise' due to uncontrollable factors (controllability). A plausible explanation for this finding might be that it is less costly for the firm to adjust for the extent to which they accurately measure performance than it is to adjust for uncontrollables. The fact that measurement accuracy does not affect the use of external non-financial performance measures, which are often measured by third parties, provides some evidence for this explanation.

The most important performance measure characteristic related to the use of performance measures is informativeness. The empirical results provide strong evidence of the use of the informativeness principle by firms. That is, rather than using performance measures that are controllable (controllability principle), firms seem to choose performance measures that provide information about manager's actions, even if these are (partly) uncontrollable. Furthermore, the RAPM literature generally states that the usefulness of financial performance measures decreases with increased task uncertainty because it affects the controllability of these measures. However, I find that task uncertainty *increases* the usefulness of financial performance measures because it increases their informativeness.

Overall, the RAPM literature is too narrowly focused on the *controllability* of *financial* performance measures and the *negative* impact of uncertainty on the controllability and therefore the usefulness of these measures. This dissertation indicates that performance measure characteristics other than controllability are more important for choosing performance measures and that uncertainty actually increases the usefulness of financial performance measures.

With respect to the effects of performance measures and performance targets, the empirical results shed a different light on the economics-based incentive effect studies. The empirical results show that performance measures do not directly affect managerial behavior. Rather, the use of performance measures for incentive purposes increases the difficulty of the performance targets related to these measures, which subsequently affect behavior. Therefore, the two components of the incentive system seem to *simultaneously* affect managerial behavior. This suggests that the focus of the economics-based studies on the incentive effects of performance measures is too narrow. The general finding in these studies is that performance measures 'positively' affect managerial behavior and performance. However, these results might be spurious, in the sense that the results are driven by the difficulty of performance targets.

The empirical results further suggest that the prediction of the principal-agent model that risk aversion affects the use of performance measures for incentive purposes does not apply to managers lower in the organization. The results show that risk aversion negatively affects the relationship between the use of performance measures and the difficulty of performance targets. This implies that superiors take the risk aversion of managers into account by adjusting the difficulty of performance targets rather than by adjusting the use of performance measures for incentive purposes.

The empirical results have also several practical implications. First, assuming that the firms that participated in this study have made efficient choices *on average*, the results suggest that informativeness and measurement accuracy are of key importance to the use of performance measures for incentive purposes, while controllability is of minor or no importance. That is, performance measures that can be influenced by subordinate managers should be used, because it is impossible to construct performance measures that are totally controllable. This suggests that superiors should identify areas where they want to see performance improvements and develop performance measures that are sensitive to subordinate managers' decisions. Furthermore, to reduce the opportunity of subordinate managers to manipulate these measures, superiors have to make sure that these measures are objective and verifiable. Second, incorporating certain performance measures in incentive contracts without emphasizing targets does not affect managerial behavior. Superiors have to set specific targets for managers to shoot for and choose the difficulty of these targets dependent on how powerful they want the incentives to be. Thus, the type of performance measure used determines the 'direction' of effort, while the difficulty of the performance target determines the 'amount' of effort provided. In terms of 'what you measure is what you get', the performance measure determines 'what you get', while the performance target determines 'how much

you get'. Third, if superiors want their subordinates to be more long-term oriented, then incorporating non-financial performance information in incentive systems can achieve this goal. Although not all non-financial performance measures provide long-term incentives, the type of performance measures used in this study, i.e., market-oriented measures, lengthen the manager's time horizon. Therefore, these measures increase the amount of time that managers spend on activities that affect future financial performance, which reduces the myopia problem. Finally, risk aversion affects the trade-off between incentives and risk sharing in the sense that fewer incentives can be given to risk averse managers. This means that it is more difficult to use incentive systems to promote certain types of behavior the higher the risk aversion of the manager. To make sure that these managers make congruent decisions, firms need to implement alternative control mechanisms.

7.4 Limitations

As with any empirical study, this study has its limitations. In this section, I analyze the extent to which this dissertation is subject to the following important limitations generally associated with survey questionnaires (Podsakoff and Organ 1986; Young 1996): (1) use of perceptual measures, (2) common-method problem, and (3) non-random sampling. Further, I discuss some limitations that are more specific.

(1) First, the variables used in the empirical analysis are based on the perceptions of the respondents. Although this is true for any study using survey questionnaires, it could specifically be a problem in this study with respect to the measurement of performance measure characteristics. The implicit assumption underlying the empirical analysis is that the performance measure characteristics perceived by the subordinate manager are identical to the 'objective' performance measure characteristics and/or to those perceived by the superior. However, in my opinion this assumption does not seem to be a problem in the current study for the following reason. The analysis in chapter 5 shows that the perceived use of performance measures is consistent with the actual incentive contract used by the firms. Given this 'validation' of the dependent variable, if the perceived performance measure characteristics are inconsistent with the objective performance measure characteristics, then this would lead to a bias against the predicted relationships, i.e., I would not find any significant results. Although the empirical results with respect to 'controllability' are inconsistent with my hypotheses, it is not likely that this is due to a measurement problem, since the empirical results further show that controllability is significantly

negatively related to environmental uncertainty, a relationship traditionally assumed throughout the whole RAPM literature.

Second, a related problem to the use of survey questionnaires is the 'common-method' problem. The common-method problem occurs when respondents report 'consistent' and 'socially desirable' answers, which leads to a bias in favor of the predicted relationships (Podsakoff and Organ 1986). Although it is impossible to rule out this problem, I believe that it is not likely to be an issue in the current study. The procedures used in designing the study and in gathering the data control for most of the reliability and validity problems that can occur when using survey questionnaires (cf. Young 1996). Further, given the multi-disciplinary nature of this study, it is unlikely that respondents 'know what to answer'.

A third potential limitation of this study is the non-random selection of firms. In chapter 5, I stated that, since eligible firms must have incentive systems, random selection is inappropriate for the purpose of this dissertation. However, the non-random selection applied might have led to a bias in the selected firms. All of the firms that participate in this study are, or once were, clients of Hay Management Consultants (HMC). As a result, these firms might have incentive systems that are different from the incentive systems of other firms that are not clients of HMC. Because it is unclear how this potential bias affects the results presented in this dissertation, the findings might not be generalizable to firms that have not been 'assisted' by compensation consultants.

Fourth, the predictions relating decision-making authority to the use of performance measures are based on the 'information asymmetry' aspect and the 'aggregation aspect' of decision-making authority. However, I do not separately account for these aspects in this dissertation. That is, these aspects of decision-making authority remain untested assumptions. As a result, the relationship between decision-making authority and the use of (financial) performance measures might be due to other reasons than those proposed in this dissertation.

Fifth, the current study is limited in the number of contingency variables used. Although uncertainty is the dominant contingency variable underlying contingency theory in organization and accounting (Hartmann 2000), there might be 'other' factors associated either with the use of performance measures or the performance measure characteristics. If these other factors are correlated with task and/or environmental uncertainty, then this study might be subject to an omitted variable problem.

Finally, I only examine the effect of incentive systems on managerial short-term orientation. Although this is an important consideration in designing incentive systems, these systems can affect other types of behavior, such as gaming, influence tactics, and job-related attitudes. Furthermore, the measurement of managerial short-term orientation does not allow any

conclusions to be made about the importance of the manager's decisions (Van der Stede 2000). For example, if managers focus on the long-term, this does not necessarily mean that long-term performance is improved.

Overall, although this study is subject to a number of limitations, I believe that the contributions of the current study, in terms of theory and empirical results, significantly outweigh the limitations.

7.5 Directions for Future Research

The results of the theoretical and empirical analysis in this dissertation provide some interesting directions for future research. First, the finding that controllability is not positively related to the use of performance measures deserves some additional attention. The accounting literature stresses the importance of the controllability principle and identifies the costs that are associated with the use of uncontrollable performance measures. However, if firms make efficient choices *on average*, then there must be increased benefits of not adjusting for the effect of uncontrollable factors. This is particularly interesting since the results indicate that the 'noise' due to the measurement process does affect the use of performance measures for incentive purposes. Future research should address the costs and benefits associated with the adjustments made with respect to the 'noise' due to the measurement process and 'noise' due to the effect of uncontrollable factors.

Second, in this study, I examine the effect of the performance measure characteristics informativeness, controllability, measurement accuracy, and performance target difficulty. Although these characteristics dominate the theoretical literature, it is unlikely that these are the only (theoretically) relevant performance measure characteristics. One opportunity for future research is to identify additional characteristics that play a role in designing incentive systems and to examine how these characteristics change with specific contextual factors.

Third, although the empirical results show that the difficulty of performance targets depends on the degree to which the performance measure is used for incentive purposes and the manager's risk aversion, the picture is far from complete. Since performance targets have significant incentive effects, future research should identify other factors that determine the difficulty of targets.

Fourth, firms use different types of non-financial performance measures of which not all are leading indicators and provide managers with long-term incentives. An opportunity for future research is to examine which non-financial

performance measures provide long-term incentives and which do not and what kind of incentives these latter performance measures do provide.

5 Fifth, the finding that incentive systems become less useful the higher the manager's risk aversion raises the question what alternative control tools firms use to promote goal congruent behavior. Almost no empirical evidence exists of how alternative control mechanisms can be used as substitutes and how these apply to managers who are highly risk averse. Future research should examine whether, for example, behavior monitoring, social control, or selection and training can substitute for the use of incentive systems.

6 Sixth, this dissertation examines the design and effects of incentive systems for subordinate managers and the discussion so far has focused on this organizational level. However, as summarized in table 2.1 (chapter 2), there are ample research opportunities at the CEO level. Especially the use and effects of performance targets at the CEO level seems to be an important area for future research. Recently this topic has received some attention (e.g., Murphy 1999b; Indjejikian et al. 2000) but much more research is needed about this component of the incentive system at the CEO level.

Finally, this dissertation uses multiple disciplines to study the design and effects of incentive systems. More specifically, it combines the implications of the economics-based and behavioral-based incentive literature. This multi-disciplinary approach has led to predictions and empirical results that extend the behavioral-based RAPM literature and the economics-based incentive effects literature. Although this dissertation takes a multi-disciplinary approach to the design and effects of incentive systems, other areas in accounting might equally benefit from this approach. In my opinion, taking a multi-disciplinary perspective is the most fruitful way to do research and advance knowledge.

appendix A

LINEAR PRINCIPAL-AGENT MODEL

A.0 Introductory Remark

This appendix discusses the linear-principal agent model developed by Holmström and Milgrom (1987). The purpose of this appendix is to explain the model in a way that a reader with no background in analytical modeling can understand the basic set-up and analytics of these models and more importantly can understand the deductions made.

The use of the linear principal-agent model in accounting research has grown over the last few years. The model is used by, for example, Bushman and Indjejikian (1993a, 1993b), Feltham and Xie (1994), and Hemmer (1995, 1996a, 1996b, 1998). The major reason for this increase in use is its (relative) simplicity and as a result the possibility of deriving empirical implications from these models.

A.1 Introduction

In their seminal paper, Holmström and Milgrom (1987) (hereafter HM) examine the provision of incentives over time for an agent with constant absolute risk aversion. They use a dynamic setting in which the agent frequently makes decisions, which are also dependent on the feedback of past performance. In this setting, they find that a simple linear contract is optimal and outperforms any complex contract due to its robustness. Although the analysis of HM is mathematically complex, their result is surprisingly simple. The dynamic model

can be reduced to a static one by imposing the following *ad hoc* restrictions: (1) the incentive contract is linear and (2) the agent makes a once-and-for-all decision on how he will allocate his effort during the employment relationship. HM show that these two assumptions are exactly offsetting, which means that the solution of the static model is identical to that of the dynamic model in which (1) the agent continuously makes decisions and (2) receives information about past performance before choosing his effort.

A.2 Linear Principal-Agent Model

The linear P/A model has the following assumptions. The principal employs an agent to do a certain job; for example, 'run a firm'. Both the principal and the agent have a negative exponential utility function over wealth, which means that both prefer more wealth to less. The measure of absolute risk aversion of the principal and agent are respectively t and r. Consequently, their utility functions are

$$principal: \quad G(w_p) = -\exp(-tw_p)$$

$$agent: \quad U(w_a) = -\exp(-rw_a)$$

The negative exponential utility function implies constant absolute risk aversion (CARA).[1] This means that a change in wealth does not affect the level of risk aversion. Thus, by using these utility functions, the model abstracts from wealth effects. Assuming that the principal is risk neutral, her utility function is represented by $G(w_p) = w_p$.

The agent chooses action a after the contract is signed and providing effort is costly to the agent because he is work averse. The work aversion of the agent is reflected by his personal cost of effort $C(a)$, which is convex ($C''>0$) and increasing ($C'>0$). For reasons of simplicity, I assume that the personal cost of effort is

$$C(a) = \frac{1}{2}a^2$$

[1] The measure of absolute risk aversion is $r = -U''/U'$ (see e.g., Kreps 1990), which is constant for a negative exponential utility function.

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[1] The measure of absolute risk aversion is $r = -U''/U'$ (see e.g., Kreps 1990), which is constant for a negative exponential utility function.

Because the action of the agent cannot be observed, the principal has to rely on jointly observable signals for incentive purposes. These signals about the agent's action are normally distributed. Technically, the agent controls the mean of the normal distribution. This means that the agent can affect the expected value of the signal. If outcome x is used for incentive purposes, then the expected value of x can be characterized by

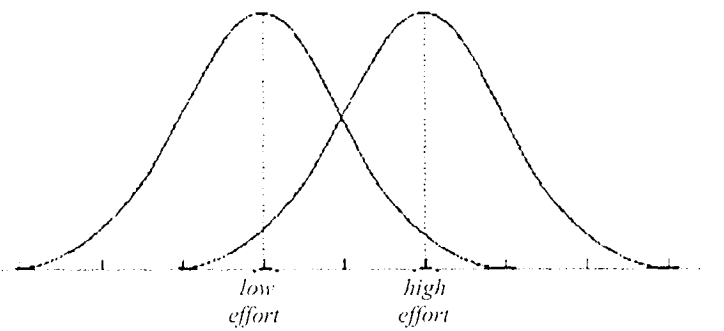
$$E[x] = h(a)$$

where $h(a)$ is increasing in a and either concave or linear, i.e., $h' > 0$ and $h'' \leq 0$. In the following, I assume that $h(a)$ is linear and more specifically

$$E[x] = fa$$

In figure A.1, it is graphically shown that an increase in effort moves the distribution to the right because it increases the expected value of x.

Figure A.1
The impact of an increase in effort on the mean of the Normal Distribution



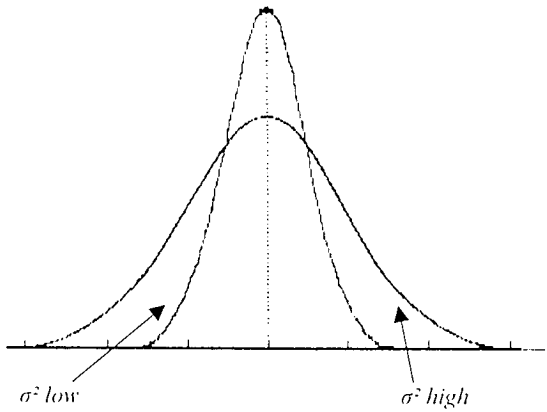
The actual outcome x is not only affected by the agent's action but also by uncontrollable factors. The degree to which the outcome x is affected by uncontrollable factors is represented by the variance of the normal distribution; the higher the variance, the greater the impact of uncontrollable factors (see figure A.2 for a graphical representation). The actual outcome x can therefore be characterized by

$$x = E[x] + \theta = fa + \theta$$

where θ is the uncontrollable component, which is normally distributed with mean zero and variance σ^2, i.e., $\theta \sim N(0,\sigma^2)$. Any linear transformation of a

normally distributed random variable is itself normally distributed. As a result, the outcome x is normally distributed.

Figure A.2
The impact of uncontrollable factors on the variance of the Normal Distribution



A final assumption of the model is the *ad hoc* restriction of the shape of the incentive contact. The incentive contract is linear and of the following form

$$s(x) = \alpha + \beta x$$

where α is a fixed payment and β is the incentive weight. The assumption of CARA is important to the linearity assumption, which can be explained by the following example. Assume that two possible outcomes exist, x_I and x_{II}, and the agent is compensated accordingly, i.e., s_I or s_{II} (see figure A.3). Because there are two points in the graph, a line can be drawn through these points. This implies that the contingent-compensation of the agent can be written as a linear incentive contract. Further, remember that the static model described here is the result of a dynamic model concerned with providing intertemporal incentives. The agent's wealth in the dynamic model changes over time. If the agent's risk aversion would increase or decrease with increases in wealth, the slope of the line would change.[2] However, by assuming CARA, the agent's risk aversion is not affected by changes in wealth, which means that the slope is stationary. As a result, the same linear incentive contract holds for aggregation of returns over time.

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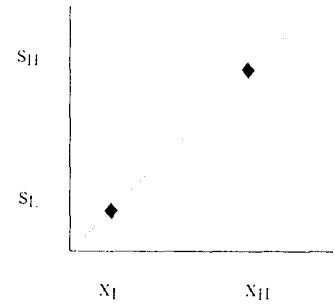
[2] If the agent becomes risk neutral, the slope will be one. If the agent becomes extremely risk averse, the slope will be zero and he is only paid a fixed wage.

Figure A.3
CARA and linear incentive contracts



The benefit of having a negative exponential utility function, normally distributed performance measures, and linear incentive contracts is that the model can be solved using certainty equivalents. Following these assumptions, the expected utility can be written as (see e.g., Hirschleifer and Riley 1995)

$$E[U \mid s(x), a] = -e^{-r(\alpha + \beta\mu - C(a) - \frac{r}{2}\beta^2\sigma^2)}$$

where μ is the expected value of the outcome x. Maximizing this expected utility is equal to maximizing the agent's certainty equivalent (expected value minus risk premium), represented by

$$E[w] - \frac{r}{2}Var[w] = \alpha + \beta\mu - C(a) - \frac{r}{2}\beta^2\sigma^2$$

The P/A model can be used to characterize the incentive weight. To find the optimal incentive weight, the following program needs to be solved

$$\max \quad E[-\exp(-rw_p)]$$

$$\textit{subject to} \quad E[-\exp(-rw_a)] \geq -1$$

$$a_i \in \arg\max \quad E[-\exp(-rw_a)]$$

where $w_p = x - s(x)$ and $w_a = s(x) - C(a)$. Thus, the agent maximizes his action given the incentive contract (second constraint; incentive compatibility) and this optimal action is the input of the objective function. Further, the agent's

compensation is constrained at zero.[3] The solution to the problem of characterizing the incentive weight can be found by taking the following steps:

1. Define the certainty equivalent of the agent (CEA);
2. differentiate CEA with respect to the agent's action and solve for the optimal action;
3. define the certainty equivalent of the principal (CEP) and the total certainty equivalent (TCE);[4]
4. fill in the optimal action into TCE, differentiate TCE with respect to the incentive weight and solve for this incentive weight.

Ad.1 *CEA.* CEA is calculated as follows: $E[w] - r/2Var[w]$. The expected value of wealth, $E[w]$, is the expected compensation minus the expected personal cost. Because the expected value of θ is zero, the expected value is

$$\alpha + \beta\mu - C(a) = \alpha + \beta fa - \frac{1}{2}a^2$$

The variance of wealth, $Var[w]$, is calculated using the following matrix notation: $\mathbf{B}^t\mathbf{\Sigma}\mathbf{B}$, where $\mathbf{B}$ is the matrix of incentive weights and $\mathbf{\Sigma}$ is the covariance matrix. Thus, the variance of wealth is $\beta^2\sigma^2$. CEA is therefore

$$\alpha + \beta fa - \frac{1}{2}a^2 - \frac{r}{2}\beta^2\sigma^2$$

Ad.2 *Optimal action.* To find the optimal action, differentiate CEA with respect to the agent's action.

$$\frac{\partial CEA}{\partial a} = \beta f - a$$

The optimal action is represented by

$$a^* = \beta f$$

---

[3] The first constraint is the individual rationality constraint, which states that the agent is preserved from getting a negative wealth by stating that the expected value should at least be 1. If $w_a = 0$, then the expected value is equal to –1. Generally, this constraint is assumed to be satisfied and therefore not used in solving the model.

[4] The assumption of 'no wealth effects', i.e., CARA, implies that an allocation among the principal and agent is efficient if and only if it maximizes their total value, i.e., TCE. See Milgrom and Roberts (1992, pp. 35-38) for a discussion of 'no wealth effects' and (total) value maximization.

Ad.3 *CEP and TCE.* Because the principal is risk neutral, i.e., $r=0$, CEP is simply the residual claim

$$E[x] - E[s(x)] = fa - \alpha - \beta fa$$

The TCE is the aggregate of CEP and CEA, i.e.,

$$fa - \frac{1}{2}a^2 - \frac{r}{2}\beta^2\sigma^2$$

Ad.4 *Optimal incentive weight.* The action a in TCE should be replaced by the optimal action a^*, which leads to

$$f\beta f - \frac{1}{2}(\beta f)^2 - \frac{r}{2}\beta^2\sigma^2$$

Differentiating the above equation with respect to β leads to

$$\frac{\partial TCE}{\partial \beta} = f^2 - \beta f^2 - r\beta\sigma^2$$

Solving this for β provides the optimal incentive weight, characterized by

$$\beta = \frac{f^2}{f^2 + r\sigma^2}$$

This characterization of the incentive weight allows an examination of the effect of the performance measure characteristics informativeness (f) and noise (σ^2) on the incentive weight. These effects are stated in the following observation;

Observation: the optimal incentive weight increases with informativeness and decreases with noise, as implied by the partial derivatives below

$$\frac{\partial \beta}{\partial f} > 0$$
$$\frac{\partial \beta}{\partial \sigma^2} < 0$$

appendix B

MEASUREMENT INSTRUMENTS

B.0 Introductory Remark and Measurement Instruments

This appendix presents the measurement instruments used in this study that are not discussed in detail in chapter 5. For the sources of these instruments and the descriptive statistics, I refer to section 5.5. The notation (R) indicates reverse coding.

Task uncertainty

Items (R)	*Answering format (1-5)*
a. My tasks are the same from day-to-day	fully disagree – fully agree
b. In general I would say that my work is fairly routine	fully disagree – fully agree
c. People in my unit do about the same job in the same way most of the time	fully disagree – fully agree
d. Basically, unit members perform repetitive activities in doing their jobs	fully disagree – fully agree
e. My duties are repetitious	fully disagree – fully agree
f. There is a clearly known way to do the major types of work I normally encounter	fully disagree – fully agree
g. There is a clearly defined body of knowledge of subject matter which can guide me in doing my work	fully disagree – fully agree
h. There is an understandable sequence of steps that can be followed in doing my work	fully disagree – fully agree
i. To do my work, I can rely on established procedures and practices	fully disagree – fully agree

Environmental uncertainty

Items	*Answering format (0 [N.R.]; 1-5)*
I. Impact of ... on functioning and performance	
a. Behavior and/or buying patterns of customers	no impact – very high impact
b. Behavior and/or strategies of competitors	no impact – very high impact
c. Technological developments in your profession	no impact – very high impact
d. Behavior and/or strategies of your suppliers	no impact – very high impact
e. Legal and/or political developments	no impact – very high impact
II. Predictability of (changes in)...(R)	
a. Behavior and/or buying patterns of customers	very unpredictable – very predictable
b. Behavior and/or strategies of competitors	very unpredictable – very predictable
c. Technological developments in your profession	very unpredictable – very predictable
d. Behavior and/or strategies of your suppliers	very unpredictable – very predictable
e. Legal and/or political developments	very unpredictable – very predictable

Decision-making authority

Items	*Answering format (1-5)*
Who has the decision-making authority with respect to...	
a. Development of new products	superior's decision – my decision
b. Hiring and firing of personnel	superior's decision – my decision
c. Selection of large investments	superior's decision – my decision
d. Budget allocations	superior's decision – my decision
e. Pricing decisions	superior's decision – my decision

Performance measure use

Items	*Answering format (1-5)*
How much importance does your superior attach to xxx performance measures in...	
a. The evaluation of your performance	no importance – very high importance
b. Periodic performance reports	no importance – very high importance
c. Officially rating your performance	no importance – very high importance
d. Periodic discussions with you	no importance – very high importance
e. Determining your salary increases	no importance – very high importance
f. Determining your annual bonus	no importance – very high importance
g. Increasing your chance of promotion	no importance – very high importance
h. Increasing your authority within the organization	no importance – very high importance

Performance target difficulty

Items	*Answering format (1-5)*
a. I do not have much trouble achieving my *xxx* performance targets, they seem somewhat easy (R)	fully disagree – fully agree
b. My *xxx* performance targets require a fair amount of effort to achieve them	fully disagree – fully agree
c. It requires a lot of my talent and know-how to achieve the *xxx* performance targets	fully disagree – fully agree
d. The *xxx* performance targets are fairly easy to attain (R)	fully disagree – fully agree
e. The *xxx* performance targets force me to continuously improve my efficiency	fully disagree – fully agree

Managerial risk aversion

Assume that your current annual fixed salary equals 100,000. You are given the possibility to choose between the following two alternatives:

Alternative 1: you keep your annual fixed salary of 100,000 with certainty

Alternative 2: your annual fixed salary becomes 80,000 and you have a chance (probability) to earn an additional bonus of 40,000

How large should the probability of earning the additional bonus of 40,000 be before you prefer alternative 2 to alternative 1? ____ (0-100%)

Managerial short-term orientation

Indicate the percentage of your time that is devoted to working on matters that will show up in your financial results within...	
a. one month or less	____
b. one month to one quarter	____
c. one quarter to one year	____
d. one year to five years	____
Total	**100%**

appendix C

STRUCTURAL EQUATION MODEL RESULTS

C.0 Introductory Remark

This appendix discusses the empirical results by each structural equation model used. Section C.1 presents the results of the structural equation models (SEM) related to Part A of chapter 6, while section C.2 presents the SEM results related to Part B of chapter 6.

C.1 SEM Results Part A

The empirical results with respect to the use of financial performance measures are shown in figure C.1. The results indicate that the use of financial performance measures increases with decision-making authority (H1a; one-tail $p<0.05$), its informativeness ($H2a_i$; one-tail $p<0.01$), and measurement accuracy ($H2a_{iii}$; one-tail $p<0.05$) and decreases with its controllability ($H2a_{ii}$; one-tail $p<0.01$). Second, consistent with my expectations, task uncertainty increases the informativeness of financial performance measures (H3a; one-tail $p<0.025$), while environmental uncertainty decreases the controllability of financial performance measures (H4a; one-tail $p<0.01$). Finally, the CFI and the IFI of the model are 0.94 and 0.95 respectively indicating good fit.[1]

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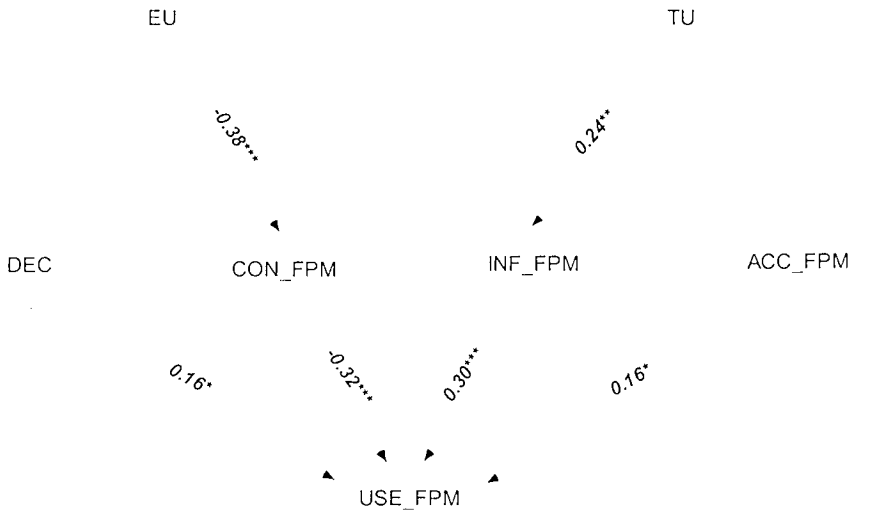
[1] The comparative fit index (CFI) and the incremental fit index (IFI) are measures of goodness-of-fit, where values close to 1 indicate a very good fit. Both measures are based on

Figure C.1
Empirical results with respect to the use of financial performance measures



Notes:
***, **, *, † is significant at respectively the 1%, 2½%, 5%, and 10% level (one-tailed) using coefficient estimates and standard errors generated from 500 random bootstrap samples (with replacement).

[a] EU = environmental uncertainty;
TU = task uncertainty;
DEC = decision-making authority;
CON_FPM = controllability of financial performance measures;
INF_FPM = informativeness of financial performance measures;
ACC_FPM = measurement accuracy of financial performance measures;
USE_FPM = use of financial performance measures.

[b] Parameters are maximum likelihood estimates.

[c] CFI = 0.94; IFI = 0.95

The results related to internal non-financial performance measures are presented in figure C.2. The effect of decision-making authority on the use of internal non-financial performance measures was unknown *a priori*. The results indicate that decision-making authority is not related to the use of internal non-financial performance measures (H1b). Further, the use of internal non-financial performance measures is positively related to its informativeness ($H2b_i$; one-tail $p<0.01$) and measurement accuracy ($H2b_{iii}$; one-tail $p<0.05$), but not related to its controllability ($H2b_{ii}$). Finally, similar to the financial performance measures,

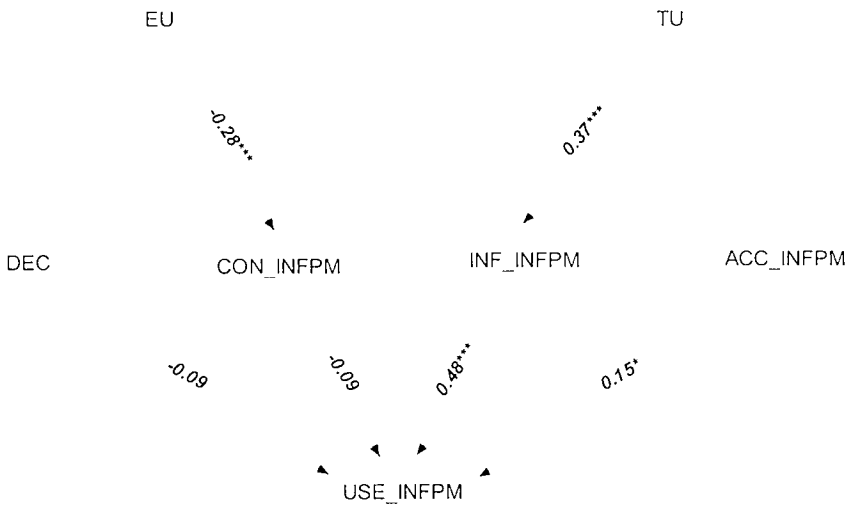
---

a comparison of the model employed with a baseline model of independence. Although no specific standard exists, it is generally recommended that these indexes should exceed 0.90.

task uncertainty increases the informativeness of internal non-financial performance measures (H3b; one-tail $p<0.01$), while environmental uncertainty decreases the controllability of these measures (H4b; one-tail $p<0.01$). The model fit measures CFI and IFI are respectively 0.91 and 0.93 reflecting good fit.

Figure C.2

Empirical results with respect to the use of internal non-financial performance measures



Notes:

***, **, *, † is significant at respectively the 1%, 2½%, 5%, and 10% level (one-tailed) using coefficient estimates and standard errors generated from 500 random bootstrap samples (with replacement).

[a] EU = environmental uncertainty;
TU = task uncertainty;
DEC = decision-making authority;
CON_INFPM = controllability of internal non-financial performance measures;
INF_INFPM = informativeness of internal non-financial performance measures;
ACC_INFPM = measurement accuracy of internal non-financial performance measures;
USE_INFPM = use of internal non-financial performance measures.

[b] Parameters are maximum likelihood estimates.

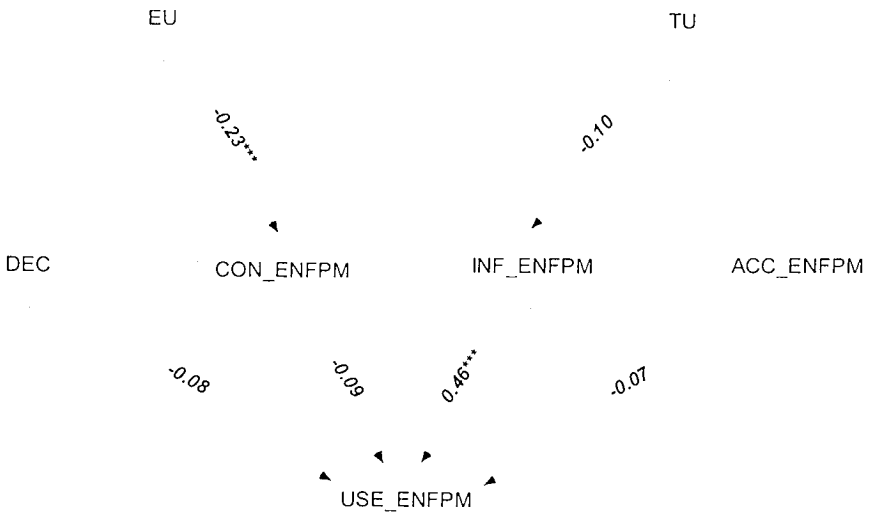
[c] CFI = 0.91; IFI = 0.93.

Figure C.3 shows the results of the empirical model examining the use of external non-financial performance measures. As with internal non-financial performance measures, the effect of decision-making authority on the use of external non-financial performance measures was unknown *a priori*. The empirical analysis shows that decision-making authority is not related to the use of external non-financial performance measures (H1c). The results further

indicate that the use of external non-financial performance measures is only related to its informativeness ($H2c_i$; one-tail $p<0.01$) and is not related to its controllability ($H2c_{ii}$) and measurement accuracy ($H2a_{iii}$). Finally, the results show that task uncertainty is not related to the informativeness of external non-financial performance measures (H3c), while environmental uncertainty decreases the controllability of external non-financial performance measures (H4c; one-tail $p<0.01$). The goodness of fit measures show that the model fit is inadequate (CFI = 0.60; IFI = 0.68).[2]

Figure C.3

Empirical results with respect to the use of external non-financial performance measures



Notes:

***, **, *, + is significant at respectively the 1%, 2½%, 5%, and 10% level (one-tailed) using coefficient estimates and standard errors generated from 500 random bootstrap samples (with replacement).

[a] EU = environmental uncertainty;
TU = task uncertainty;
DEC = decision-making authority;
CON_ENFPM = controllability of external non-financial performance measures;
INF_ENFPM = informativeness of external non-financial performance measures;
ACC_ENFPM = measurement accuracy of external non-financial performance measures;
USE_ENFPM = use of external non-financial performance measures.

[b] Parameters are maximum likelihood estimates.

[c] CFI = 0.60; IFI = 0.68.

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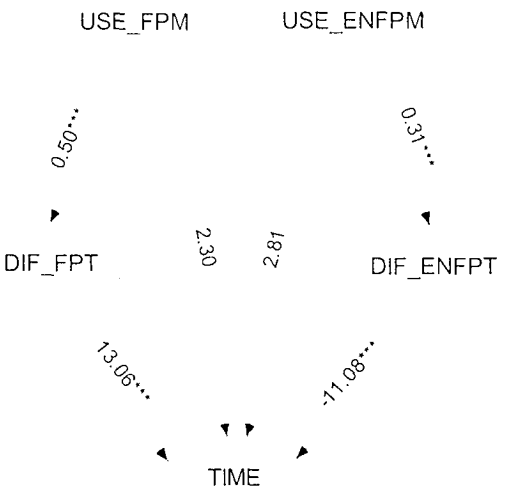
[2] Rerunning the model without incorporating the effect of task uncertainty on informativeness, which was expected to be absent, leads to good fit, as indicated by the CFI (0.91) and IFI (0.93).

Figure C.4
Empirical results with respect to the effects of performance measures and performance targets



Notes:
***, **, *, † is significant at respectively the 1%, 2½%, 5%, and 10% level (one-tailed) using coefficient estimates and standard errors generated from 500 random bootstrap samples (with replacement).

[a] USE_FPM = use of financial performance measures;
USE_ENFPM = use of external non-financial performance measures;
DIF_FPT = difficulty of financial performance target;
DIF_ENFPT = difficulty of external non-financial performance target;
TIME = managerial short-term orientation.

[b] Parameters are maximum likelihood estimates.

[c] CFI = 0.89; IFI = 0.89

C.2 SEM Results Part B

The empirical results, shown in figure C.4, indicate that both the use of financial performance measures and the use of external non-financial performance measures are not related to managerial short-term orientation. Therefore, hypotheses 5a and 5b are not supported by the data, which seems to be inconsistent with previous research. On the other hand, the results provide strong support for hypotheses 6a and 6b. The difficulty of the financial performance target is positively related to managerial short-term orientation (one-tail $p<0.01$), while the difficulty of the external non-financial performance target is negatively related to managerial short-term orientation (one-tail $p<0.01$). Finally, for both the financial performance measures and the external

non-financial performance measures, the use of these performance measure for incentive purposes increases the difficulty of the performance targets (one-tail $p<0.01$), which supports hypothesis 7. The CFI and IFI of the full model are both 0.89 indicating less than adequate fit, though close to the cut-off value of 0.90.

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SUMMARY IN DUTCH

Performance Measures and Performance Targets in Incentive Systems: An Empirical Study of Use and Effects

Dit proefschrift beschrijft een empirisch onderzoek naar het gebruik van prestatiemaatstaven en prestatiedoelen voor beoordelings- en beloningsdoeleinden en de effecten hiervan op het gedrag van managers. Hoofdstuk 1 bevat de inleiding van het proefschrift en beschrijft hoe het onderzoek past binnen het vakgebied management control. Management control behelst de beheersing van individuen binnen organisaties met als doel de gedragingen van deze individuen in overeenstemming te laten zijn met de doelstellingen van de organisatie. Cruciaal binnen management control is het motiveren van individuen. Een van de vele manieren om managers te motiveren, is het implementeren van beoordelings- en beloningssystemen ('incentive systems'). Deze systemen bestaan uit drie componenten: (1) prestatiemaatstaven, (2) prestatiedoelen, en (3) beloningen. Deze componenten zorgen ervoor dat managers weten wat van hen wordt verwacht en dat ze gemotiveerd zijn om inzet te leveren aangezien dit tot een bepaalde beloning zal leiden.

De vragen die in dit proefschrift centraal staan, zijn (1) welke factoren kunnen het gebruik van verschillende prestatiemaatstaven voor beoordelings- en beloningsdoeleinden verklaren en (2) welke effecten hebben deze prestatiemaatstaven en de gerelateerde prestatiedoelen op het gedrag van managers.

In hoofdstuk 2 wordt een beknopt overzicht gegeven van de wetenschappelijke empirische literatuur op het gebied van beoordelings- en beloningssystemen. Het overzicht geeft aan dat, met betrekking tot managers in gedecentraliseerde organisaties, er relatief weinig empirisch onderzoek is gedaan naar (1) beoordelings- en beloningssystemen die gebruik maken van niet-financiële informatie, (2) de factoren die het gebruik van prestatiemaatstaven verklaren, en (3) de effecten van prestatiedoelen. Er wordt een aantal redenen gegeven waarom dit problematisch is.

In hoofdstuk 3 worden de drie theorieën beschreven die ten grondslag liggen aan de empirisch literatuur uit hoofdstuk 2, namelijk: agency theorie, contingentie theorie, en goal theorie. In het hoofdstuk wordt aangegeven dat een multidisciplinaire aanpak de leemtes kan vullen die zijn geïdentificeerd in hoofdstuk 2. Ten eerste kunnen de implicaties van de contingentie en agency theorie worden gecombineerd om het gebruik van prestatiemaatstaven te kunnen verklaren. Deze combinatie geeft aan dat onzekerheid de belangrijkste contingentie variabele is. Verder geeft het aan dat de karakteristieken van de prestatiemaatstaven bepalend zijn voor het gebruik en dat deze karakteristieken worden beïnvloed door onzekerheid. Drie karakteristieken worden onderscheiden: (1) de mate waarin de manager invloed heeft op de prestatiemaatstaf, (2) de mate waarin onbeheersbare factoren invloed hebben op de prestatiemaatstaf en (3) de mate waarin de maatstaf objectief en verifieerbaar is.

Ten tweede kunnen de implicaties van de agency en goal theorie worden gecombineerd om de effecten van beoordelings- en beloningssystemen te onderzoeken. Deze combinatie geeft aan dat het enkel en alleen gebruiken van prestatiemaatstaven en het niet benadrukken van prestatiedoelen waarschijnlijk niet erg efficiënt is in termen van voldoende invloed uitoefenen op het gedrag van managers. Aangezien beoordelings- en beloningssystemen bestaan uit prestatiemaatstaven *en* prestatiedoelen en beide een invloed hebben op gedrag is het van belang om het gezamenlijke effect te onderzoeken.

Samenvattend leidt de multidisciplinaire aanpak tot de volgende onderzoeksvragen: (1) welk effect hebben de karakteristieken van prestatiemaatstaven op het gebruik van deze maatstaven?; (2) hoe worden de karakteristieken van prestatiemaatstaven beïnvloed door onzekerheid?; en (3) welk effect heeft het gebruik van prestatiemaatstaven en de haalbaarheid van prestatiedoelen op het gedrag van managers?

In hoofdstuk 4 worden de hypothesen afgeleid op basis van de implicaties van hoofdstuk 3. Tevens wordt in dit hoofdstuk onzekerheid opgesplitst in twee typen onzekerheid: (1) taakonzekerheid en (2) omgevingsonzekerheid. Verwacht wordt dat beide een effect hebben op verschillende karakteristieken van prestatiemaatstaven.

Hoofdstuk 5 beschrijft de onderzoeksmethode en specifiek het ontwerp en uitvoering van het empirische onderzoek. Het onderzoek is uitgevoerd door middel van interviews, een schriftelijke enquête en archiefgegevens. In totaal is aan 202 managers een enquête verstuurd, waarvan er 114 ingevuld zijn terugontvangen.

In hoofdstuk 6 worden de empirische resultaten besproken en de hypothesen uit hoofdstuk 4 getoetst. Uit de empirische analyse blijkt dat het merendeel van de hypothesen wordt geaccepteerd.

Hoofdstuk 7 geeft een samenvatting van de empirische resultaten die zijn besproken in hoofdstuk 6 en stelt dat de multidisciplinaire aanpak vruchtbaar is geweest. Op basis van de empirische resultaten worden de volgende conclusies getrokken.

Op de eerste plaats wordt geconcludeerd dat de mate waarin een manager invloed heeft op een prestatiemaatstaf de belangrijkste karakteristiek is voor het bepalen van het gebruik van deze maatstaf voor beoordelings- en beloningsdoeleinden. Dit betekent dat de onderzochte beoordelings- en beloningssystemen in overeenstemming zijn met het 'informativeness' principe. Dat wil zeggen, prestatiemaatstaven die informatie verstrekken over de beslissingen van managers worden gebruikt, ook al worden deze maatstaven beïnvloed door onbeheersbare factoren. Tevens speelt de mate waarin de prestatiemaatstaf objectief en verifieerbaar is een belangrijke rol bij het bepalen van het gebruik van deze maatstaf. Echter, de mate waarin onbeheersbare factoren invloed hebben op de prestatiemaatstaf heeft niet het verwachte effect op het gebruik en er wordt geconcludeerd dat bedrijven het 'controllability' principe niet toepassen. Dat wil zeggen, het gebruik van een bepaalde prestatiemaatstaf neemt niet af naarmate de onbeheersbaarheid toeneemt. Het tegenovergestelde is zelfs van toepassing op financiële prestatiemaatstaven. Er wordt geconcludeerd dat met name financiële prestatiemaatstaven nuttig zijn om een bewustzijn bij managers te creëren met betrekking tot de invloed van onbeheersbare factoren.

Wat betreft de invloed van onzekerheid op de karakteristieken van prestatiemaatstaven wordt geconcludeerd dat onzekerheid eerder een positief effect heeft op de karakteristieken van financiële prestatiemaatstaven dan een negatief effect. Taakonzekerheid blijkt de bruikbaarheid van financiële prestatiemaatstaven te vergroten aangezien het de informatieve waarde van deze maatstaven, met betrekking tot de beslissingen van managers, vergroot. Verder blijkt dat omgevingsonzekerheid niet alleen de beheersbaarheid van financiële prestatiemaatstaven verlaagt, maar tevens de beheersbaarheid van niet-financiële prestatiemaatstaven. De traditioneel veronderstelde 'tekortkoming' van financiële prestatiemaatstaven blijkt dus eveneens een tekortkoming te zijn van niet-financiële maatstaven. Echter, aangezien financiële prestatiemaatstaven

nuttig zijn om een bewustzijn van onbeheersbare factoren te creëren, neemt de bruikbaarheid van deze maatstaven juist toe naarmate er meer omgevingsonzekerheid is.

In relatie tot de derde onderzoeksvraag wordt geconcludeerd dat prestatiemaatstaven een indirect effect hebben op het gedrag van managers. Naarmate prestatiemaatstaven belangrijker worden voor beoordelings- en beloningsdoeleinden worden de daaraan gerelateerde prestatiedoelen moeilijker haalbaar, wat vervolgens het gedrag bepaalt. Uit het onderzoek blijkt dat het gebruik van financiële (niet-financiële) prestatiemaatstaven leidt tot moeilijker haalbare financiële (niet-financiële) prestatiedoelen en dit leidt vervolgens tot beslissingen die zijn gericht op korte-termijn (lange-termijn) financiële resultaten. Prestatiemaatstaven bepalen dus de 'richting' van het gedrag, terwijl de haalbaarheid van de prestatiedoelen de 'hoogte' van de inzet bepaalt.

Hoofdstuk 7 wordt afgesloten met een bespreking van de tekortkomingen van het empirisch onderzoek en er worden aanbevelingen gedaan voor toekomstig onderzoek op het gebied van beoordelings- en beloningssystemen.

CURRICULUM VITAE

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